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U. S. DEPARTMENT OF COMMERCE
IARRY L. HOPKINS, Secretary

BUREAU OF FISHERIES
LES E. JACKSON, Acting Commissioner

Administrative Report No. 38

PROPAGATION AND DISTRIBUTION OF FOOD FISHES

FISCAL YEAR 1939

By GLEN C. LEACH, M. C. JAMES
and E. J. DOUGLASS

Appendix IV to Report of Commissioner of Fisheries
for the Fiscal Year 1939

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ADMINISTRATIVE REPORT SERIES

Since the advent of the Administrative Report Series, considerable confusion has arisen concerning its system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No.—." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 20 were, they are numbered for filing purposes as follows:

No. 1. Report, Commissioner of Fisheries, 1931.
No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
No. 3. Fishery Industries of the United States, 1930.
No. 4. Progress in Biological Inquiries, 1930.
No. 5. Propagation and Distribution of Food Fishes, 1931.
No. 6. Report, Commissioner of Fisheries, 1932.
No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
No. 8. Fishery Industries of the United States, 1931.
No. 9. Progress in Biological Inquiries, 1931.
No. 10. Propagation and Distribution of Food Fishes, 1932.
No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
No. 12. Progress in Biological Inquiries, 1932.
No. 13. Fishery Industries of the United States, 1932.
No. 14. Propagation and Distribution of Food Fishes, 1933.
No. 15. Fishery Industries of the United States, 1933.
No. 16. Alaska Fishery and Fur-Seal Industries, 1933.
No. 17. Progress in Biological Inquiries, 1933.
No. 18. Propagation and Distribution of Food Fishes, 1934.
No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
No. 20. Fishery Industries of the United States, 1934.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

PROPAGATION AND DISTRIBUTION OF FOOD FISHES, FISCAL YEAR 1939[1]

By Glenn C. Leach, *Chief*, M. C. James, *Assistant Chief*, and E. J. Douglass, *Superintendent of Distribution, Division of Fish Culture*

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INTRODUCTION

In announcing the gross production of 8,024,540,685 fish and eggs at Federal fish hatcheries during the fiscal year 1939, the Bureau recognizes that the significance of such a contribution is obscured without further analysis in the form of a report of hatchery production in terms of pounds of fish. However, no such treatment can be followed in handling the billions of fry and eggs of commercial marine species, but it is expected to place in operation during the fiscal year 1940 a system of weighing all the game fish distributed. Again, the production of a few hundred thousand fry or fingerlings of a species which is subject to intense fishing pressure, such as certain species of Pacific salmon, is of greater importance than the distribution of millions of fish of lesser economic value, such as the yellow perch.

It may well be asked why these figures are not reversed and maximum production maintained with the varieties which exhibit the greatest need for restorative measures. This question can be answered by pointing out that, broadly speaking, artificial propagation must be geared to the egg supply, and a depleted species is its own limiting factor upon the scope of artificial replenishment measures.

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[1] Administrative Report No. 38, Appendix IV to the Report of the U. S. Commissioner of Fisheries for the fiscal year 1939. Approved for publication April 23, 1940.

Fish-cultural technology extends from the production of an entirely "synthetic" fish, such as game trout, to a process of byproduct recovery as exemplified in the propagation of shad. A brook trout may be hatched from an egg obtained from a domesticated brood stock held at a private commercial hatchery and may be reared to a size permitting its capture by the angler immediately after its release from the hatchery. This is a synthetic but definite increment of a recreational resource.

On the other hand, migrating shad, when caught for market, may be carrying over 30,000 mature eggs which can be incubated in a hatchery and released as fry. The survival ratio of these fry cannot now be accurately determined, but it is known that without the intervention of the hatchery, the reproductive contribution of the parent fish would be zero.

Hatcheries have failed to stem the depletion of certain species, such as the whitefish, but their role as an elemental factor in conserving the majority of the food and game species is widely conceded. The administration of this activity requires attention to the methods and technique of hatching, rearing, feeding, and transporting fish; to the maintenance and upkeep of the physical plant and equipment; and to the construction of new facilities. The year under review has shown tangible progress in all these aspects. While it has been possible to continue the services rendered to the general public by the stocking of public waters, much of the increased production attained in recent years has been diverted to maintaining the stock of fish in areas under direct Federal ownership or control.

Complete transition to this type of activity is not anticipated, however, as long as the present unbalanced ratio between fishing demand and fish populations in State waters exists. The succeeding tabulations and comments are presented with the purpose of clarifying the significance of the various types of fish-cultural functions carried on by the Bureau.

SPECIES PROPAGATED

During 1939 there were handled at the hatcheries and rescue stations 47 species, the majority of which are fresh-water types. No attempt has been made to propagate a dozen or more important food fishes which are found in the coastal waters. No practicable methods for propagating certain of these forms have been developed, and there is further doubt as to whether results would be sufficiently valuable to warrant the effort.

In addition to the varieties listed in the table, there are propagated forage fishes comprising some half dozen species of minnows and shiners. These are utilized as food for bass, etc., at the hatcheries and are not available for general distribution or listed in the production records.

No carp, humpback salmon, or Atlantic salmon were handled during the year although these forms were propagated previously. The carp were dropped because of the desire to devote available funds to the propagation of more valuable forms. The "off year" for humpback salmon made it impracticable to obtain eggs of this species and no Atlantic salmon eggs were available from any source.

Kentucky, or spotted bass were distributed for the first time, and the hatching of mackerel was resumed on a limited scale.

The hatchery records reveal interesting facts regarding the popularity of different game species. There appears to be no "All-American" fish, but the largemouth bass most closely approaches this classification. The popularity of the trouts is sectional, with the species native to the different regions rated highest in popularity in their respective sections. The smallmouth bass is highly popular although somewhat restricted in range and has, in the past, presented a production problem which is being rapidly overcome.

The commercial species which have been distributed are those which are most amenable to artificial propagation and are not necessarily those which are of the highest economic value.

- Catfishes (*Siluridae*):
  - Catfish (*Leptops olivaris*).
  - Spotted channel catfish (*Ictalurus punctatus*).
  - Bullhead (*Ameiurus nebulosus*).
- Buffalofish (*Catostomidae*): Common buffaloes ((*Ictiobus* sp.).
- Shad and herring (*Clupeidae*):
  - Shad (*Alosa sapidissima*).
  - Glut herring (*Pomolobus aestivalis*).
- Whitefishes and Lake herring (*Coregonidae*):
  - Common whitefish (*Coregonus clupeaformis*).
  - Lake herring, cisco (*Leucicthys* sp.).
- Salmons and trouts (*Salmonidae*):
  - Chinook, king, or quinnat salmon (*Oncorhynchus tschawytscha*).
  - Chum salmon (*Oncorhynchus keta*).
  - Coho salmon, silver salmon (*Oncorhynchus kisutch*).
  - Red Salmon, sockeye, or blueback salmon (*Oncorhynchus nerka*).
  - Landlocked sockeye salmon, silver trout (*Oncorhynchus kennerlyi*).
  - Steelhead trout (*Salmo gairdnerii*).
  - Landlocked salmon (*Salmo sebago*).
  - Rainbow trout (*Salmo irideus*).
  - Black-spotted trout, cut-throat trout (*Salmo clarki*).
  - Brown or Loch Leven trout (*Salmo fario* var.).
  - Lake trout, mackinaw trout (*Cristivomer namaycush*).
  - Brook trout (*Salvelinus fontinalis*).
  - Golden trout (*Salmo agua-bonita*).
- Grayling (*Thymallidae*): Montana grayling (*Thymallus montanus*).
- Pikes (*Esocidae*): Pike and pickerel (*Esox* sp.).
- Sunfishes (*Centrarchidae*):
  - Crappie (*Pomoxis annularis* and *P. Sparoides*).
  - Largemouth blackbass (*Micropterus salmoides*).
  - Smallmouth black bass (*Micropterus dolomieu*).
  - Kentucky bass (*Micropterus pseudoplites*).
  - Rock bass (*Ambloplites rupestris*).
  - Warmouth bass (*Chaenobryttus gulosus*).
  - Bluegill sunfish (*Lepomis incisor*).
  - Green sunfish (*Lepomis cyanellus*).
  - Redbreasted bream (*Lepomis auritus*).
  - Red-eared sunfish (*Lepomis heros*).
  - Common sunfish (*Lepomis gibbosus*).
- Mojarras de rio (*Cichlidae*):
  - Rio Grande perch (*Herichthys cyanoguttatus*).
- Perches (*Percidae*):
  - Pike Perch (*Stizostedion vitreum*).
  - Yellow perch, ringed perch (*Perca flavescens*).
- White basses (*Serranidae*):
  - White bass (*Roccus chrysops*).
  - Striped bass (*Roccus saxatilis*).
  - White perch (*Morone americana*).

Cods (*Gadidae*):
  Cod (*Gadus callarias*).
  Haddock (*Melanogrammus aeglefinus*).
  Pollock (*Pollachius virens*).
Mackerel (*Scombridae*): Common mackerel (*Scomber scombrus*).
Flounders (*Pleuronectidae*): Winter flounder (*Pseudopleuronectes americanus*).
Lobster (*Homaridae*): Lobster (*Homarus americanus*).

Summary, by species, of the output of fish and fish eggs during the fiscal year ending June 30, 1939

Species	Eggs	Fry	Fingerlings	Total
Catfish		10, 000	417, 865	427, 865
Buffalofish	78, 681, 500		800	78, 682, 300
Shad		39, 323, 220		39, 323, 220
Whitefish	32, 960, 000	920, 000		33, 880, 000
Lake herring		3, 000, 000		3, 000, 000
Striped bass		1, 797, 950		1, 797, 950
Chinook salmon	5, 607, 200	21, 812, 610	26, 469, 400	53, 889, 210
Chum salmon	1, 369, 000	7, 594, 900	375, 250	9, 339, 150
Silver salmon			716, 675	716, 675
Sockeye salmon	75, 000		2, 343, 505	2, 418, 505
Sockeye salmon, landlocked	122, 960		444, 155	567, 115
Steelhead trout	35, 000		935, 255	970, 255
Landlocked salmon			5, 990	5, 990
Rainbow trout	4, 329, 850	238, 140	10, 402, 915	14, 970, 905
Blackspotted trout	26, 362, 290	2, 328, 440	11, 436, 040	40, 126, 770
Loch Leven trout	77, 490		1, 421, 035	1, 498, 525
Lake trout	276, 280	1, 636, 750	103, 670	2, 016, 700
Brook trout	5, 000	1, 410, 500	10, 308, 065	11, 723, 565
Golden trout	6, 100		71, 040	77, 140
Grayling	1, 799, 800	4, 496, 750	258, 050	6, 554, 600
Pike and pickerel	1, 643, 150			1, 643, 150
Crappie			430, 745	430, 745
Black bass, largemouth		3, 787, 650	8, 668, 965	12, 456, 615
smallmouth		1, 400, 500	325, 360	1, 725, 860
Kentucky bass		7, 000	3, 350	10, 350
Rock bass			121, 960	121, 960
Warmouth bass			91, 415	91, 415
Sunfish			8, 788, 400	8, 788, 400
Rio Grande perch			175, 760	175, 760
Pike perch	4, 271, 950	330, 490, 000		334, 761, 950
White perch		4, 300, 000	260	4, 300, 260
Yellow perch		300, 666, 000	17, 030	300, 683, 030
Mackerel		11, 060, 000		11, 060, 000
Cod	3, 047, 863, 700	132, 605, 200		3, 180, 468, 900
Haddock	1, 172, 796, 700	5, 768, 300		1, 178, 565, 000
Flatfish (flounder)		1, 185, 940, 100		1, 185, 940, 100
Pollock	1, 446, 519, 100	50, 762, 700		1, 497, 281, 800
Lobster		4, 048, 950		4, 048, 950
Total	5, 824, 802, 070	2, 115, 405, 660	84, 332, 955	8, 024, 540, 685

PRODUCTION

The 1939 output of 8,024,540,685 fish and eggs was an insignificant reduction from the production for the previous year of 8,121,131,985. The former figure presents a yield derived almost 100 percent from the hatcheries, in comparison with the situation during previous years when an average of over 50 million fish was obtained from rescue and salvage operations. The negligible number of salvaged fish in the 1939 record is responsible for the noticeable decline in the distribution of fingerlings and larger fish. These amounted to 84,332,955 in comparison with 119,184,705 for 1938. All the fish formerly collected from the overflow areas of the upper Mississippi River were from 4 to 6 months old, and this stock must hereafter be replaced by fish reared in the hatchery ponds.

Sixteen varieties were propagated in larger numbers than during the previous year; among them the important chinook salmon, shad, lake trout, grayling, largemouth and smallmouth bass, pike perch, cod and haddock.

There was included in the total a production of 102,366,985 game and pan species, a percentage of approximately 1.3. As has been previously asserted, practically all the species propagated by the Bureau are sought by anglers to some degree. However, in designating "game and pan species" the Bureau is guided by the classifications of the State fisheries laws and by the determination of whether a given species supports an extensive commercial fishery. If such is the case, it is listed as a non-game species.

The most important point to be considered in analyzing the production records is the difference between gross and net output. The aggregate production of the individual hatcheries is greater than the actual or net plantings of fish because of the fact that transfers are made between different stations. The station hatching and shipping fish must of necessity be given credit for this production; and the station which subsequently rears and plants the fish is likewise entitled to credit for the number distributed. It is further evident that this involves a duplication in the summary or grand total. During 1939 there were 833,335 fish transferred between the stations. Deducting this from the grand total by species leaves a net distribution of 2,198,905,280 fish and 5,824,802,070 eggs as an actual increment to the fish population resulting from the Division's activities. For the same reason the record of distribution by States (see p. 596) will not check in its totals with the summary by species.

While extensive repair and improvement work was under way throughout the year at most of the stations, in very few instances did this interfere materially with the fish production. The Bureau has not as yet achieved its objective for the production of a greater proportion of trout and bass of legal size. Costs, both for fish food and personnel, as well as the increased expense of distributing larger fish, remain the chief limiting agents.

CONSTRUCTION ACTIVITIES

Shortly before the start of the fiscal year the Division received an allotment of $808,500 from the Public Works Administration and $544,856 from the Works Progress Administration. The former was intended largely for the procurement of materials and supplies, while the latter was solely for labor. These amounts were reallocated to the various projects as listed in the following table:

Stations receiving P. W. A. and W. P. A. allotments during the fiscal year 1939

Location	Amount of P.W.A. project	Amount of W. P. A. project
Alabama: Marion	$15,000	$10,920
Arkansas: Mammoth Spring	5,000	3,500
California:		
Battle Creek	5,000	3,500
Mill Creek	5,000	3,000
Colorado:		
Creede	3,500	----------
Leadville	7,500	6,500
Florida: Welaka	30,000	23,000
Georgia:		
Lake Park	15,000	10,000
Warm Springs	15,000	10,000
Cohutta	----------	3,000
Idaho:		
Hagerman	10,000	5,000
Salmon	5,000	5,000
Indiana: Rochester	18,000	----------
Iowa:		
Fairport	$3,000	$1,230
Guttenberg	30,000	13,300
Manchester	15,000	10,000
Kentucky: Louisville	3,500	4,306
Louisiana: Natchitoches	10,000	15,000
Maine:		
Boothbay Harbor	5,000	2,500
East Orland	5,000	3,600
Massachusetts:		
Gloucester	15,000	5,000
Hartsville	5,000	5,000
Woods Hole	15,000	10,000
Michigan:		
Charlevoix	10,000	5,000
Northville	15,000	10,000
Minnesota: Duluth	7,500	2,500

Stations receiving P. W. A. and W. P. A. allotments during the fiscal year 1939—Continued

Location	Amount of P.W.A. project	Amount of W,P.A. project
Mississippi: Tupelo	$10,000	$5,000
Missouri: Neosho	10,000	----------
Montana:		
Bozeman	10,000	5,000
Ennis	15,000	10,000
Nebraska: Crawford	5,000	5,000
New Hampshire:		
Nashua	5,000	10,000
York Pond (Berlin)	10,000	18,000
New Mexico:		
Dexter	10,000	5,000
Santa Rosa	5,000	5,000
New York:		
Cape Vincent	15,000	12,400
Cortland	15,000	10,000
North Carolina:		
Edenton	5,000	2,500
Hoffman	12,000	3,500
Oklahoma: Reagan (near Tishomingo)	15,000	25,000
Oregon:		
Butte Falls	15,000	----------
Clackamas	15,000	12,500
Pennsylvania: Lamar	15,000	25,000
South Carolina:		
Orangeburg	5,000	12,500
Walhalla	3,000	3,000
South Dakota: Spearfish	10,000	8,000
Tennessee:		
Erwin	10,000	5,000
Flintville	7,500	17,500
Texas:		
Fort Worth	40,000	20,000
Inks Dam (Austin)	35,000	(1)
Texas—Continued.		
San Angelo	$5,000	$10,000
San Marcos	5,000	5,000
Uvalde	15,000	10,000
Utah:		
Laketown	10,000	5,000
Springville	8,000	7,000
Vermont:		
Pittsford	3,500	2,500
St. Johnsbury	5,000	5,000
Swanton (Lakeland)	3,500	2,500
Virginia:		
Fort Belvoir	10,000	----------
Wytheville	15,000	----------
Washington:		
Big White Salmon	5,000	5,000
Birdsview	10,000	10,000
Carson	10,000	10,000
Little White Salmon	15,000	5,000
Quinault	6,000	5,000
Spokane	5,000	5,000
West Virginia:		
Leetown	48,000	51,600
White Sulphur Springs	8,000	7,000
Wisconsin:		
Genoa	25,000	----------
LaCrosse	10,000	5,000
Lake Mills	8,000	----------
Wyoming: Saratoga	8,000	3,500
Total	808,500	544,856

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[1] N. Y. A. labor furnished.

Certain supplementary W. P. A. allotments were received later in the year, increasing the amount available for labor. The work involved replacement of pipe lines; complete construction of new water-supply systems; construction, repair, and improvement of buildings; construction of ponds; installation of new equipment; and general landscaping. In some instances there was a 100-percent increase in the productive capacity of a station through such improvements.

The principal development of an entirely new nature was the construction of a pondfish hatchery at the Roy Inks Dam, on the lower Colorado River in Texas. The site was furnished by the Lower Colorado River Authority and construction was supervised by the Bureau. It was financed by a portion of the P. W. A. allotment and by the assignment of N. Y. A. labor. At the close of the year this project was virtually complete and some of the ponds were stocked with fingerling bass. The output of the establishment is planned for distribution in the series of reservoirs created on the Colorado River.

Noticeable improvements were effected at the Fort Worth (Tex.) station, where an additional tract of land was donated by the city of Fort Worth and utilized for the development of additional ponds. The Charlevoix (Mich.) Hatchery, which had been closed since 1933, was entirely rehabilitated and equipped for the rearing of lake trout fingerlings. In several instances State W. P. A. projects were also in effect and made possible additional improvements. An outstanding example of this was at Guttenberg, Iowa, where initial work on a large-scale pondfish hatchery, within the Upper Mississippi River Wildlife and Fish Refuge, was undertaken.

Curtailment of the scope of the Civilian Conservation Corps resulted in some restriction on the construction work prosecuted by this agency for the Bureau. A limited number of assignees were held on at Lamar, Pa., but the C. C. C. development program at the York Pond (N. H.) station was terminated, although the work was continued by the utilization of other funds.

At Arcadia, R. I., development of a bass hatchery by the Bureau and the Soil Conservation Service of the Department of Agriculture continued. This had been originally started as a recreational project under the Farm Security Administration and the major part of the construction has been continued by the successor to that agency. The Bureau contributed supervision and limited funds for the purchase of materials and equipment. Due to shortage of funds the work was suspended at the close of the year with the expectation that it would be resumed early in the fiscal year 1940.

The National Park Service secured an allotment of emergency funds for the construction of a new hatchery at Creston, near Kalispell, Mont. This establishment is intended to replace the obsolete Glacier Park fish hatchery, although it is located outside the boundaries of the park itself. The work, which was started in the spring, was being prosecuted by the National Park Service, with the Bureau represented in an advisory capacity. The operation of this hatchery is to be taken over by the Bureau upon completion.

In addition to the improvements made possible by direct cash allotments to the Bureau, the Appropriation Act for 1939 carried the sum of $155,000 providing for the construction of new hatcheries in Kansas, North Dakota, Minnesota, and Ohio. Early in the year a suitable site was located at Valley City, N. Dak., and construction work was started in the late fall. At the close of the year the hatchery was approximately 75 percent completed, although not in readiness for operation. At this point a State W. P. A. project was of material help in securing maximum returns from the appropriation available.

After a careful survey the three remaining hatcheries were designated for sites at Hebron, Ohio, Farlington, Kans., and New London, Minn. Various difficulties were encountered in acquiring clear titles to these sites, with resultant delay in starting actual construction. However, at the close of the year preparations were being made to initiate the construction phase at each of these locations, although no actual development had been undertaken. The appropriations made for these hatcheries were continued available during the fiscal year 1940.

The construction activities summarized above have resulted not only in actual increase of hatchery facilities but have also made it possible to take care of maintenance and rehabilitation work, the need for which has been accumulating over a number of years.

COOPERATION WITH OTHER CONSERVATION AGENCIES

Much of the most effective work performed during the year has been in cooperation with one or more other public or private agencies whose functions relate to the conservation of fish life. Such coordination has been applied in matters as simple as the delivery of a consignment of fish or as complex as the development of a program for preserving the salmon run in the Columbia and the Sacramento Rivers, where the survival of the species is threatened by huge dam construction projects.

In working out the details of these various joint undertakings, frequent contact has been maintained with Federal departments, bureaus and agencies, with more than 30 State conservation departments, with several municipalities and county governments, and with innumerable sportsmen's and conservation organizations of a semipublic nature. The mechanism for coordination has consisted of broad general agreements, such as have been set up with the United States Forest Service, the National Park Service, the Tennessee Valley Authority, and several of the States. There have also been specific written agreements covering individual problems or projects as well as informal understandings reached by conference between field employees or headquarters officials. In the latter case the meetings of the National Planning Council of Fish and Game Commissioners have afforded an opportunity for channeling Federal and State fish-cultural activities toward maximum efficiency and utility.

As an indication of the manner in which conservation activities have been prosecuted on a joint basis, there are cited below various instances and examples. These do not present the full scope of such undertakings but space limitations necessitate many omissions.

The relationships maintained with the counties of Monroe and Onondaga, N. Y., for the purpose of propagating and distributing fish in local waters, have served as a model for a similar undertaking with the city of Danville, Va. Initial steps have been taken whereby the Bureau will supply fish for the maintenance of angling in lakes and streams developed by the city for hydroelectric purposes. The city will, according to plans, meet the costs of developing necessary facilities and caring for the fish.

The exchange of eggs and fish has been of material benefit, particularly in Michigan, Minnesota, and in some of the Western States, such as Oregon.

In the Tennessee Valley area three-way agreements between the Bureau of Fisheries, the Tennessee Valley Authority, and the States of Alabama, Tennessee, and North Carolina have been made effective or are being negotiated. The Tennessee Valley Authority had practically completed on June 30 a large pondfish hatchery on the Elk River in Alabama, and the Bureau was making arrangements to establish personnel and take over the operation. This is in addition to the hatchery already operated at Norris, Tenn., which is scheduled for enlargement. The fish produced at these facilities are to be distributed by the States in that part of the Tennessee Valley area which is included in the respective State boundaries.

In addition to cooperating with the National Park Service in the stocking of National Park waters, a brief reconnaissance and survey was made on the Chesapeake and Ohio Canal on the Potomac River above Washington, D. C. This property had been acquired by the National Park Service for recreational purposes, and it is expected that angling will be one of the outstanding recreational features. Agreement has been formulated whereby the Bureau will work with the Park Service in building up the angling.

In view of the tremendous responsibility of the Forest Service, of the Department of Agriculture, for the maintenance of fishing in the national forests, there has been need for unusual cooperation with that agency. A new trout-rearing unit was under construction in the Alleghany National Forest in Pennsylvania, in accordance with plans developed and approved by the Bureau, with the expectation that the unit would be operated by this Bureau upon completion.

The North Dakota Fish and Game Department donated to the Bureau the site for the new hatchery at Valley City, and further local assistance was received by the donation of pipe, a pump, etc. The North Carolina Fish and Game Department has contacted the Bureau freely and frequently relative to mutual problems, and it has been possible to render reciprocal assistance in the propagation of shad, the selection and inspection of hatchery sites for State development, and in the distribution of trout. A very large part of the production of the Marion (Ala.) station has been transported in State distribution trucks.

At St. Louis, Mo., the city officials have approved the construction, at no cost to the Bureau, of a modern administration and service building in the Forest Park hatchery. The series of ponds in the municipal park system was taken over by the Bureau for operation shortly before the start of the fiscal year 1939, and results have been most gratifying.

The State of Minnesota exhibited splendid cooperative spirit in donating to the Bureau a tract of land, together with the water rights, for the proposed hatchery at New London, and made available the services of its surveyors and engineers in acquiring additional property. Local interests raised a sum of money for the purchase of some of the additional acreage needed for the hatchery. The same cooperative assistance was obtained in Kansas, where the State Fish and Game Department donated water rights to a State-owned lake which is to serve as the primary water supply for the hatchery ponds.

Ohio purchased and donated to the Bureau a splendid location for the new hatchery to be constructed in that State. In consideration of this courtesy the Bureau approved the relinquishment to the State of the Federal hatchery property at Put in Bay. However, such action requires Congressional sanction, and the necessary legislation had not been passed at the close of the year.

Organized sportsmen's groups throughout the country have sought technical advice on stocking problems and have submitted many applications for fish to be reared in nursery ponds sponsored and maintained by these organizations.

ASSIGNMENTS OF FISH AND FISH EGGS TO STATES, TERRITORIES, AND FOREIGN COUNTRIES

The transfer of approximately 166,000,000 fish and eggs to other fish-cultural agencies in the United States and its possessions was closely in line with the scope of such shipments in previous years. Forty States were the recipients of this form of Federal aid. In a number of cases the transfer was handled on an exchange basis, the Bureau being compensated by the State furnishing eggs or fish of needed species. The benefits in this procedure lie in the fact that many States were thus able to procure species which would be unobtainable from other sources. Also, where State hatchery facilities are limited in capacity, the Bureau's assignments have been the backbone of the States' stocking programs. Some lobsters were turned over to Maine for rearing in the new State rearing station. Flounder fry were allocated to New Jersey from the Woods Hole (Mass.) station. Nebraska received a few grayling eggs, which would have been difficult to obtain elsewhere.

The Bureau had a surplus of certain species in some areas and has established the policy of disposing of such surpluses to nearby States whenever possible. The assignments reported in the following table should not be confused with the listing of Distribution by States, since the latter also covers fish delivered on applications or planted directly by Bureau employees.

Assignments of fish and fish eggs to State fish commissions, fiscal year 1939

States and species	Eggs	Fry	Fingerlings, etc.	Total
Alabama:				
Black bass, largemouth		19,000	92,925	111,925
Sunfish			507,720	507,720
Arizona:				
Blackspotted trout	800,300			800,300
Grayling	100,000			100,000
Colorado:				
Blackspotted trout	1,000,000			1,000,000
Brook trout			65,650	65,650
Rainbow trout			52,250	52,250
Connecticut:				
Black bass, smallmouth		386,000		386,000
Brook trout			15,000	15,000
Rainbow trout	52,000			52,000
Florida: Black bass, largemouth		6,000	15,550	21,550
Georgia:				
Black bass, largemouth		35,970	7,280	43,250
Crappie			900	900
Sunfish			165,500	165,500
Idaho:				
Blackspotted trout	450,000		98,700	548,700
Brook trout			1,500	1,500
Rainbow trout			135,730	135,730
Sockeye salmon, landlocked	122,960		318,200	441,160
Illinois:				
Black bass, largemouth			4,000	4,000
Black bass, smallmouth		50,000		50,000
Pike perch		1,500,000		1,500,000
Sunfish			24,000	24,000
Indiana:				
Black bass, largemouth			50,500	50,500
Brook trout			75,000	75,000
Loch Leven trout			88,140	88,140
Rainbow trout			69,250	69,250
Rock bass			19,500	19,500
Sunfish			123,000	123,000
Iowa:				
Black bass, largemouth			5,355	5,355
Rock bass			1,000	1,000
Sunfish			114,940	114,940
Kentucky: Black bass, smallmouth		140,000	1,200	141,200
Maine: Lobster		46,450		46,450
Maryland:				
Black bass, largemouth			35,125	35,125
Rainbow trout			43,235	43,235
Massachusetts:				
Brook trout			75,000	75,000
Lobster		40,000		40,000
Rainbow trout	100,000			100,000
Michigan:				
Grayling	100,500			100,500
Rainbow trout	509,500			509,500
Sunfish			25,000	25,000
Minnesota:				
Black bass, largemouth			154,550	154,550
Crappie			10,125	10,125
Loch Leven trout	25,000			25,000
Rainbow trout	314,500			314,500
Sunfish			22,600	22,600
Missouri: Black bass, smallmouth		100,000		100,000

Assignments of fish and fish eggs to State fish commissions, fiscal year 1939—Con.

States and species	Eggs	Fry	Fingerlings, etc.	Total
Montana:				
Black bass, largemouth			900	900
Blackspotted trout	2, 500, 800			2, 500, 800
Brook trout			42, 600	42, 600
Catfish			7, 750	7, 750
Crappie			1, 330	1, 330
Chum salmon	364, 000			364, 000
Golden trout			10, 000	10, 000
Grayling			26, 700	26, 700
Loch Leven trout			61, 000	61, 000
Rainbow trout	515, 200		1, 625	516, 825
Nebraska:				
Grayling	25, 000		2, 770	27, 770
Pike perch	4, 000, 000			4, 000, 000
Rainbow trout			8, 500	8, 500
Nevada: Chum salmon	252, 000			252, 000
New Hampshire: Brook trout		167, 500		167, 500
New Jersey:				
Flounder		11, 774, 000		11, 774, 000
Rainbow trout	155, 000		17, 400	172, 400
New Mexico:				
Black bass, largemouth			130, 525	130, 525
Black bass, smallmouth			9, 500	9, 500
Blackspotted trout	1, 100, 500			1, 100, 500
Catfish			9, 410	9, 410
Crappie			24, 310	24, 310
Rainbow trout	1, 000, 800			1, 000, 800
Sunfish			424, 050	424, 050
New York: Rainbow trout	240, 000			240, 000
North Carolina:				
Black bass, largemouth		12, 500	30, 650	43, 150
Crappie			10, 200	10, 200
Rainbow trout	514, 200		60, 085	574, 285
Striped bass		693, 750		693, 750
Sunfish			4, 700	4, 700
North Dakota:				
Black bass, largemouth			49, 040	49, 040
Crappie			23, 470	23, 470
Sunfish			19, 000	19, 000
Ohio:				
Black bass, largemouth			8, 000	8, 000
Loch Leven trout			25, 000	25, 000
Rainbow trout			25, 150	25, 150
Rock bass			7, 500	7, 500
Sunfish			30, 000	30, 000
Oregon:				
Blackspotted trout	500, 100			500, 100
Brook trout			385, 145	385, 145
Chinook salmon			40, 000	40, 000
Rainbow trout			140, 000	140, 000
Steelhead trout			63, 000	63, 000
Pennsylvania: Rainbow trout			60, 000	60, 000
Rhode Island: Flounder		121, 445, 000		121, 455, 000
South Carolina:				
Black bass, largemouth			32, 900	32, 900
Rainbow trout	200, 000		40, 000	240, 000
South Dakota:				
Black bass, largemouth			14, 000	14, 000
Blackspotted trout			22, 000	22, 000
Catfish			20, 800	20, 800
Crappie			8, 000	8, 000
Loch Leven trout			12, 500	12, 500
Rainbow trout			60, 000	60, 000
Sunfish			20, 000	20, 000
Tennessee:				
Brook trout			6, 980	6, 980
Loch Leven trout	52, 490			52, 490
Rainbow trout			36, 000	36, 000
Rock bass			1, 800	1, 800
Sunfish			6, 500	6, 500
Utah:				
Black bass, largemouth			325	325
Blackspotted trout	700, 400			700, 400
Chum salmon	753, 000			753, 000
Grayling	994, 300			994, 300
Vermont:				
Brook trout		725, 000		725, 000
Landlocked salmon			5, 990	5, 990
Virginia: Rainbow trout			200, 755	200, 755

Assignments of fish and fish eggs to State fish commissions, fiscal year 1939—Con.

States and species	Eggs	Fry	Fingerlings, etc.	Total
Washington:				
Blackspotted trout	750, 900		26, 180	777, 080
Brook trout			97, 000	97, 000
Sockeye salmon	75, 000			75, 000
Rainbow trout			90, 345	90, 345
West Virginia:				
Black bass, largemouth			9, 250	9, 250
Black bass, smallmouth			5, 000	5, 000
Crappie			10, 610	10, 610
Loch Leven trout			4, 695	4, 695
Rainbow trout			152, 685	152, 685
Sunfish			93, 050	93, 050
White perch			260	260
Wisconsin:				
Black bass, largemouth			46, 700	46, 700
Loch Leven trout			20, 000	20, 000
Wyoming:				
Blackspotted trout	4, 231, 300			4, 231, 300
Brook trout			15, 600	15, 600
Grayling	305, 000		10, 000	315, 000
Rainbow trout			30, 000	30, 000
Total	22, 804, 750	137, 151, 170	5, 227, 660	165, 233, 580

The shipment of fish and eggs to foreign countries has been an interesting but unimportant activity of the Division for many years. While such consignments have been furnished gratis from available hatchery stocks, no expense has been incurred in forwarding the shipments. During the past year an initial shipment of 250,000 lake trout eggs was sent to Peru, as a start on a program of establishing this species in Lake Titicaca. Due to insufficient time for the necessary preparation and scheduling of the shipment, the eggs were a total loss. Rainbow eggs were sent to England as a means of introducing new blood into the existent stocks of the species in that country. Rainbow trout eggs and fry were sent to Costa Rica and Colombia as an experiment, with little success. As usual, rainbow eggs were forwarded to Puerto Rico in line with plans to develop angling as a means of attracting tourists to that island.

There were additional inquiries from serveral other countries relative to securing some species of American fishes, but for various reasons no action was taken.

Shipments of fish and fish eggs to territories and foreign countries, fiscal year 1939

Destination and species	Shipping station	Eggs	Fry	Fingerlings, etc.	Total
Colombia:					
Brook trout	New York Aquarium		150		150
Rainbow trout	do		150		150
Do	Leetown, W. Va			100	100
Costa Rica: Rainbow trout	Neosho, Mo	25, 000			25, 000
England: Rainbow trout	White Sulphur Springs, W. Va	50, 000			50, 000
Peru: Lake trout	Cape Vincent, N. Y	250, 000			250, 000
Puerto Rico:					
Rainbow trout	Bourbon, Mo	250, 000			250, 000
Do	Eagle Nest, N. Mex	151, 000			151, 000
Total		726, 000	300	100	726, 400

TRANSFER OF EGGS BETWEEN STATIONS

The economy of concentrating upon egg production at 3 or 4 stations, from which shipments can be made to other points, has frequently been emphasized. This practice was continued throughout the past year and over 43 million eggs of 10 different species were transferred between various stations. The following table sets forth in detail all such transfers.

Transfer of eggs between stations, fiscal year 1939

Species	Number of eggs	From—	To—
Blackspotted trout	200,340	Saratoga, Wyo	Jackson, Wyo.
	200,300	Yellowstone Park, Wyo	Baker Lake, Wash.
	300,100	do	Birdsview, Wash.
	2,625,300	do	Bozeman, Mont.
	600,200	do	Carson, Wash.
	250,100	do	Clackamas, Oreg.
	1,150,200	do	Crawford, Nebr.
	400,200	do	Creede, Colo.
	100,100	do	Eagle Nest, N. Mex.
	811,400	do	Ennis, Mont.
	3,000,800	do	Glacier Park, Mont.
	725,400	do	Hagerman, Idaho.
	1,000,300	do	Jackson, Wyo.
	100,100	do	Laketown, Utah.
	575,400	do	Leadville, Colo.
	25,200	do	Leetown, W. Va.
	650,400	do	Mount Rainier, Wash.
	300,100	do	Quilcene, Wash.
	200,000	do	Quinault, Wash.
	475,400	do	Salmon, Idaho.
	800,300	do	Saratoga, Wyo.
	50,200	do	Spearfish, S. Dak.
	300,200	do	Spokane, Wash.
	1,025,500	do	Springville, Utah.
Brook trout	358,500	Cape Vincent, N. Y	Barneveld, N. Y.
	300,000	do	Cortland, N. Y.
	50,000	Craig Brook, Maine	Cape Vincent, N. Y.
	250,000	do	Cortland, N. Y.
	600,000	do	Lamar, Pa.
	228,000	do	Nashua, N. H.
	500,000	do	Walhalla, S. C.
	300,000	do	White Sulphur Springs, W. Va.
	500,000	do	Wytheville, Va.
	100,000	Leadville, Colo	Hagerman, Idaho.
	100,000	do	Laketown, Utah.
	100,000	do	Saratoga, Wyo.
	100,000	Creede, Colo	Laketown, Utah.
	100,000	do	Spearfish, S. Dak.
	362,000	do	Springville, Utah.
	300,000	National Forest of New Hampshire.	La Crosse, Wis.
	386,750	do	St. Johnsbury, Vt.
	100,000	do	Walhalla, S. C.
	150,000	Pittsford, Vt	Leetown, W. Va.
Chinook salmon	2,878,000	Little White Salmon	Carson, Wash.
Chum salmon	233,470	Quilcene, Wash	Laketown, Utah.
	3,475,000	Walcott Sloughs, Wash	Duckabush, Wash.
	4,630,000	do	Quilcene, Wash.
Grayling	300,000	Yellowstone Park, Wyo	Bozeman, Mont.
	250,100	do	Ennis, Mont.
	100,000	do	Jackson, Wyo.
	275,500	do	Springville, Utah.
Lake trout	50,000	Cape Vincent, N. Y	Craig Brook, Maine.
	63,000	do	Rochester, N. Y.
	201,000	Duluth, Minn	Cape Vincent, N. Y.
	25,920	do	Laketown, Utah.
	25,000	do	Leadville, Colo.
Loch Leven trout	57,450	Cape Vincent, N. Y	Barneveld, N. Y.
	50,880	do	Cortland, N. Y.
Pike perch	525,000	Put in Bay, Ohio	Norris, Tenn.
	525,000	do	Wytheville, Va.
Rainbow trout	200,000	Eagle Nest, N. Mex	Crawford, Nebr.
	500,000	do	Creede, Colo.
	250,000	do	Bozeman, Mont.
	600,000	do	Leadville, Colo.
	239,000	do	Springville, Utah.

Transfer of eggs between stations, fiscal year 1939—Continued

Species	Number of eggs	From—	To—
Rainbow trout	5,250	Leetown, W. Va	Aquarium, Washington, D. C.
	104,100	do	Barneveld, N. Y.
	51,030	do	Craig Brook, Maine.
	50,540	do	Hartsville, Mass.
	201,000	do	Lamar, Pa.
	311,100	Manchester, Iowa	Bozeman, Mont.
	328,200	do	Crawford, Nebr.
	102,000	do	Duluth, Minn.
	203,800	do	LaCrosse, Wis.
	76,900	do	Lake Mills, Wis.
	102,000	do	Northville, Mich.
	25,000	Neosho, Mo	Cortland, N. Y.
	121,000	do	Erwin, Tenn.
	108,000	do	Lamar, Pa.
	1,109,500	do	Saratoga, Wyo.
	412,000	do	Smokemont, N. C.
	317,000	do	Walhalla, S. C.
	75,000	Salmon, Idaho	Birdsview, Wash.
	170,000	do	Carson, Wash.
	158,000	do	Hagerman, Idaho.
	100,000	do	Smokemont, N. C.
	200,000	do	Spokane, Wash.
	250,000	Springville, Utah	Carson, Wash.
	50,000	do	Hagerman, Idaho.
	100,000	do	Laketown, Utah.
	15,100	do	Seattle, Wash.
	190,100	do	Spokane, Wash.
	100,000	White Sulphur Springs, W. Va	Cortland, N. Y.
	100,000	do	Craig Brook, Maine.
	50,000	do	Hartsville, Mass.
	50,000	do	Nashua, N. H.
	250,000	Wytheville, Va	Flintville, Tenn.
	100,000	do	LaCrosse, Wis.
	75,000	do	Rochester, N. Y.
	825,000	Yellowstone Park, Wyo	Ennis, Mont.
	400,200	do	Glacier Park, Mont.
Steelhead trout	25,000	Birdsview, Wash	Leadville, Colo.

STATION OUTPUT

The following list of producing units represents an increase of 6 stations over the previous year. The 1939 production was obtained from a total of 52 main stations and 46 substations located in 39 States. Although the output of each of these units is primarily intended for the restocking of waters in contiguous areas, the production of any of them may, nevertheless, reach 2 or 3 different States.

The Marianna (Fla.), Las Vegas (Nev.), Cohutta (Ga.), and Lyman (Miss.), stations, which were constructed during the fiscal year 1938, as authorized by the act of May 21, 1930, were among those that contributed for the first time this season.

The Genoa (Wis.), unit, which is being constructed in the Upper Mississippi Wild Life and Fish Refuge, was completed to such an extent that three ponds, with an area of approximately 60 acres, were placed under production in the spring of 1939. During the month of June there were collected and distributed from these ponds approximately 2 million fingerling black bass. The Palestine (W. Va.) station, which is owned by the West Virginia Conservation Commission, was operated in cooperation with that agency for the stocking of waters in the western part of West Virginia, and therefore appears in the following summary. The Clark Fork (Idaho) unit was constructed as a W. P. A. project sponsored by the Idaho Fish and Game Department on land donated by the Bonner County

Sportsmen's Association. After being turned over to the Bureau on September 11, 1938, it was immediately placed on a productive basis. The Carpenter's Brook (N. Y.) station, which is operated in cooperation with the Onondaga County sportsmen, was nearly completed and an output of trout was attained.

Due to the development of the 9-foot channel in the upper Mississippi River, rescue operations were discontinued from the Lynxville (Wis.) and Homer (Minn.) stations. The latter unit was maintained as a repair shop and supply depot.

Stations and substations operated and the output of each, fiscal year 1939

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Berlin, N. H.:				
Brook trout		67,500	325,915	393,415
Lake trout			3,500	3,500
Rainbow trout			1,100	1,100
St. Johnsbury, Vt.:				
Black bass, largemouth			1,275	1,275
Brook trout		1,235,000		1,235,000
Landlocked salmon			5,990	5,990
Birdsview, Wash.:				
Blackspotted trout			209,500	209,500
Brook trout			97,000	97,000
Rainbow trout	10,000		178,700	188,700
Steelhead trout	35,000		813,700	848,700
Chum salmon			140,000	140,000
Silver salmon			362,000	362,000
Sockeye salmon			27,370	27,370
Mount Rainier, Wash.:				
Blackspotted trout			5,000	5,000
Spokane, Wash.:				
Blackspotted trout			64,380	64,380
Brook trout			3,000	3,000
Rainbow trout			161,375	161,375
Boothbay Harbor, Maine:				
Cod	1,419,860,000			1,419,860,000
Flatfish		603,000,000		603,000,000
Haddock	417,832,000			417,832,000
Lobster		2,900,450		2,900,450
Pollock	517,305,000			517,305,000
Bozeman, Mont.:				
Blackspotted trout	4,000		1,193,080	1,197,080
Brook trout			283,260	283,260
Golden trout	6,100		71,040	77,140
Loch Leven trout	25,000			25,000
Rainbow trout	515,200		345,660	860,860
Grayling			231,050	231,050
Glacier Park, Mont.:				
Blackspotted trout		1,858,820		1,858,820
Rainbow trout		238,140		238,140
Ennis, Mont.:				
Blackspotted trout			448,040	448,040
Loch Leven trout			268,400	268,400
Rainbow trout			609,000	609,000
Grayling		200,000	27,000	227,000
Miles City, Mont.:				
Black bass, largemouth			20,505	20,505
Sunfish			114,680	114,680
Catfish			45,065	45,065
Crappie			69,250	69,250
Cape Vincent, N. Y.:				
Black bass, smallmouth		64,400	27,735	92,135
Brook trout		108,000		108,000
Lake trout	250,000	759,000		1,009,000
Loch Leven trout			1,000	1,000
Whitefish		20,000		20,000
Barneveld, N. Y.:				
Brook trout			142,800	142,800
Loch Leven trout			44,490	44,490
Rainbow trout			15,430	15,430
Cortland, N. Y.:				
Brook trout			325,600	325,600
Lake trout			9,870	9,870
Loch Leven trout			12,600	12,600
Rainbow trout			22,755	22,755

NOTE.—Stations *italicized* are substations of the preceding station in roman type.

Stations and substations operated and the output of each, fiscal year 1939—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Watertown, N. Y.:				
Brook trout			41, 290	41, 290
Lake trout			300	300
Loch Leven trout			17, 625	17. 625
Rainbow trout			16, 055	16, 055
Carson, Wash.:				
Blackspotted trout			254, 000	254, 000
Brook trout			294, 750	294, 750
Rainbow trout			228, 000	228, 000
Chinook salmon		1, 998, 710	674, 430	2, 673, 140
Little White Salmon, Wash.:				
Chinook salmon	5, 060, 000	9, 216, 000	1, 750, 000	16, 026, 000
Big White Salmon, Wash.:				
Brook trout			174, 000	174, 000
Chinook salmon	25, 000	10, 597, 900	3, 875, 300	14, 498, 200
Clackamas, Oreg.:				
Brook trout			508, 145	508, 145
Chinook salmon	2, 200		1, 029, 250	1, 031, 450
Rainbow trout			87, 000	87, 000
Battle Creek, Calif.:				
Chinook salmon	520, 000		10, 736, 505	11, 256, 505
Butte Falls, Oreg.:				
Chinook salmon			917, 030	917, 030
Rainbow trout			140, 000	140, 000
Steelhead trout			63, 000	63, 000
Mill Creek, Calif.:				
Chinook salmon			7, 352, 000	7, 352, 000
Clark Fork, Idaho:				
Blackspotted trout			225, 000	225, 000
Sockeye salmon, landlocked	122, 960		318, 200	441, 160
Craig Brook, Maine:				
Brook trout			553, 620	553, 620
Lake trout			67, 800	67, 800
Rainbow trout			4, 800	4, 800
Crawford, Nebr.:				
Blackspotted trout			398, 000	398, 000
Brook trout			374, 350	374, 350
Rainbow trout			568, 080	568, 080
Black bass, largemouth			67, 450	67. 450
Rock bass			5, 115	5, 115
Sunfish			13, 150	13, 150
Catfish			72, 625	72, 625
Crappie			28, 775	28, 775
Yellow perch			10, 000	10, 000
Dexter, N. Mex.:				
Black bass, largemouth			471, 350	471, 350
Sunfish			468, 600	468, 600
Catfish			19, 090	19, 090
Crappie			29, 310	29, 310
Santa Rosa, N. Mex.:				
Black bass, largemouth			48, 200	48, 200
Black bass, smallmouth			11, 000	11, 000
Sunfish			63, 050	63, 050
Catfish			1, 940	1, 940
Crappie			3, 320	3, 320
Duluth, Minn.:				
Brook trout			174, 000	174, 000
Lake trout	26, 280	877, 750		904, 030
Loch Leven trout			47, 000	47, 000
Rainbow trout			20, 000	20, 000
Lake herring		3, 000, 000		3, 000, 000
Pike perch		13, 640, 000		13, 640, 000
Whitefish		900, 000		900, 000
Edenton, N. C.:				
Black bass, largemouth		112, 000	70, 200	182, 200
Sunfish			8, 000	8, 000
Crappie			4, 625	4, 625
Shad		6, 615, 000		6, 615, 000
Yellow perch		998, 000	140	998, 140
White perch		4, 300, 000		4, 300, 000
Weldon, N. C.:				
Striped bass		1, 797, 950		1, 797, 950
Elephant Butte, N. Mex.:				
Black bass, largemouth			373, 750	373, 750
Sunfish			142, 500	142, 500
Crappie			8, 400	8, 400
Erwin, Tenn.:				
Black bass, largemouth		985, 500	78, 235	1, 063, 735
Black bass, smallmouth			24, 000	24, 000
Rock bass			8, 575	8, 575
Sunfish			40, 630	40, 630
Brook trout			191, 755	191, 755
Rainbow trout			450, 830	450, 830

Stations and substations operated and the output of each, fiscal year 1939—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Fairport, Iowa:				
Black bass, largemouth		18,000	103,410	121,410
Black bass, smallmouth			3,600	3,600
Buffalofish	38,850,000		800	38,850,800
Catfish		10,000	224,135	234,135
Crappie			9,300	9,300
Sunfish			360,240	360,240
Flintville, Tenn.:				
Black bass, largemouth			6,600	6,600
Black bass, smallmouth			4,750	4,750
Rock bass			1,200	1,200
Crappie			550	550
Brook trout			5,500	5,500
Rainbow trout			119,450	119,450
Sunfish			22,550	22,550
Fort Belvoir, Va.:				
Black bass, largemouth			500	500
Catfish			50	50
Crappie			200	200
Shad		26,000,000		26,000,000
Sunfish			20,590	20,590
Yellow perch		299,668,000	1,850	299,669,850
Gloucester, Mass.:				
Cod	1,628,003,700	132,605,200		1,760,608,900
Flatfish		14,410,100		14,410,100
Haddock	754,964,700	5,768,300		760,733,000
Lobster		1,148.500		1,148,500
Pollock	929.214,100	50,762,700		979,976,800
Hagerman, Idaho:				
Blackspotted trout			245,200	245,200
Brook trout			115,545	115,545
Rainbow trout			473,660	473,660
Sockeye salmon			159.870	159,870
Salmon, Idaho:				
Blackspotted trout			137,900	137,900
Rainbow trout			1,078,920	1,078,920
Steelhead trout			17,360	17,360
Hartsville, Mass.:				
Black bass, smallmouth		773,000		773,000
Brook trout			363,755	363,755
Rainbow trout			27,345	27,345
LaCrosse, Wis.:				
Black bass, largemouth			66,550	66,550
Brook trout			615,100	615,100
Loch Leven trout			232,700	232,700
Rainbow trout			234,800	234,800
Crappie			1,225	1,225
Sunfish			1,500	1,500
Yellow perch			50	50
Bellevue, Iowa:				
Buffalofish	39,191,500			39,191,500
Genoa, Wis.:				
Black bass, largemouth			1,926,220	1,926,220
Black bass, smallmouth			15,345	15,345
Catfish			6,300	6,300
Crappie			18,295	18.295
Sunfish			25,175	25,175
Yellow perch			600	600
Guttenberg, Iowa:				
Black bass, largemouth			2,620	2,620
Black bass, smallmouth			1,000	1,000
Buffalofish	640,000			640,000
Catfish			14,700	14,700
Crappie			57,370	57,370
Pike and pickerel	1,643,150			1,643,150
Pike perch	271,950			271,950
Sunfish			48,100	48,100
Lake Mills, Wis.:				
Black bass, largemouth			216,875	216,875
Black bass, smallmouth			6,625	6,625
Crappie			2,200	2,200
Brook trout			85,050	85,050
Loch Leven trout			63,320	63,320
Rainbow trout			83,200	83,200
Marquette, Iowa:				
Black-bass, largemouth			6,040	6,040
Crappie			5,035	5,035
Sunfish			1,205	1,205
Lake Park, Ga.:				
Black bass, largemouth			26,600	26,600
Catfish			2,050	2,050
Crappie			900	900
Sunfish			101,300	101,300

Stations and substations operated and the output of each, fiscal year 1939—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Lamar, Pa.:				
Brook trout			293, 140	293, 140
Loch Leven trout			112, 090	112, 090
Rainbow trout			256, 650	256, 650
Ogletown, Pa.:				
Brook trout			17, 050	17, 050
Las Vegas, Nev.:				
Black bass, largemouth			80, 000	80, 000
Leadville, Colo.:				
Blackspotted trout			500, 400	500, 400
Brook trout			659, 200	659, 200
Loch Leven trout			102, 800	102, 800
Rainbow trout			527, 570	527, 570
Creede, Colo.:				
Blackspotted trout			391, 500	391, 500
Brook trout			1, 292, 900	1, 292, 900
Rainbow trout			487, 600	487, 600
Eagle Nest, N. Mex.:				
Blackspotted trout			93, 000	93, 000
Brook trout			57, 900	57, 900
Rainbow trout	1, 151, 800		429, 500	1, 581, 300
Leetown, W. Va.:				
Black bass, largemouth			9, 040	9, 040
Black bass, smallmouth			9, 070	9, 070
Brook trout	5, 000		25, 850	30, 850
Lock Leven trout	52, 500		58, 945	111, 445
Rainbow trout	3, 000		540, 940	543, 940
Sunfish			10, 950	10, 950
Louisville, Ky.:				
Black bass, largemouth		48, 000	15, 680	63, 680
Black bass, smallmouth		323, 600	10, 980	334, 580
Rock bass			17, 400	17, 400
Crappie			300	300
Sunfish			11, 475	11, 475
Mammoth Spring, Ark.:				
Black bass, largemouth			202, 050	202, 050
Black bass, smallmouth		237, 000	150, 000	387, 000
Rock bass			5, 600	5, 600
Sunfish			22, 000	22, 000
Manchester, Iowa:				
Black bass, largemouth			950	950
Rock bass			14, 000	14, 000
Brook trout			173, 700	173, 700
Loch Leven trout			139, 700	139, 700
Rainbow trout	1, 338, 200		120, 225	1, 458, 425
Marion, Ala.:				
Black bass, largemouth		504, 000	563, 590	1, 067, 590
Rock bass			1, 770	1, 770
Crappie			420	420
Sunfish			2, 158, 610	2, 158, 610
Cohutta, Ga.:				
Black bass, largemouth		6, 000	16, 000	22, 000
Black bass, smallmouth		2, 500		2, 500
Kentucky bass		5, 000	2, 250	7, 250
Lyman, Miss.:				
Black bass, largemouth			162, 690	162, 690
Sunfish			521, 200	521, 200
Marianna, Fla.:				
Black bass, largemouth		114, 000	92, 650	206, 650
Tupelo, Miss.:				
Black bass, largemouth		198, 000	383, 485	581, 485
Sunfish			271, 905	271, 905
Warm Springs, Ga.:				
Black bass, largemouth		250, 000	24, 380	274, 380
Catfish			7, 220	7, 220
Sunfish			172, 185	172, 185
Nashua, N. H.:				
Brook trout			173, 060	173, 060
Loch Leven trout			3, 400	3, 400
Rainbow trout			8, 815	8, 815
Catfish			200	200
Neosho, Mo.:				
Black bass, largemouth		496, 000	97, 515	593, 515
Rock bass			9, 900	9, 900
Catfish			4, 750	4, 750
Crappie			32, 900	32, 900
Rainbow trout	53, 500		59, 845	113, 345
Sunfish			20, 790	20, 790
Forest Park, Mo.:				
Black bass, largemouth			239, 220	239, 220
Crappie			19, 850	19, 850
Catfish			6, 300	6, 300
Sunfish			125, 200	125, 200

Stations and substations operated and the output of each, fiscal year 1939—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Natchitoches, La.:				
Black bass, largemouth		117, 000	188, 330	305, 330
Warmouth bass			42, 115	42, 115
Sunfish			601, 200	601, 200
Tishomingo, Okla.:				
Black bass, largemouth			81, 500	81, 500
Crappie			26, 830	26, 830
Sunfish			608, 650	608, 650
Northville, Mich.:				
Black bass, largemouth			6, 395	6, 395
Black bass, smallmouth			9, 225	9, 225
Brook trout			725, 070	725, 070
Loch Leven trout			71, 240	71, 240
Rainbow trout			184, 185	184, 185
Sunfish			120, 050	120, 050
Orangeburg, S. C.:				
Black bass, largemouth			512, 395	512, 395
Warmouth bass			12, 200	12, 200
Catfish			500	500
Crappie			815	815
Sunfish			481, 475	481, 475
Yellow perch			1, 800	1, 800
Jacksonboro, S. C.:				
Shad		1, 534, 000		1, 534, 000
Hoffman, N. C.:				
Black bass, largemouth		25, 000	193, 700	218, 700
Warmouth bass			36, 000	36, 000
Crappie			54, 050	54, 050
Sunfish			534, 365	534, 365
Palestine, W. Va.:				
Black bass, largemouth			10, 250	10, 250
Black bass, smallmouth			5, 050	5, 050
Sunfish			147, 150	147, 150
Crappie			18, 800	18, 800
White perch			260	260
Pisgah Forest, N. C.:				
Brook trout			14, 200	14, 200
Loch Leven trout			13, 145	13, 145
Rainbow trout			22, 620	22, 620
Pittsford, Vt.:				
Brook trout			40, 530	40, 530
Rainbow trout			3, 800	3, 800
Put in Bay, Ohio:				
Pike perch	4, 000, 000	316, 000, 000		320, 000, 000
Whitefish	32, 960, 000			32, 960, 000
Quinault, Wash.:				
Chinook salmon			116, 250	116, 250
Silver salmon			140, 510	140, 510
Sockeye salmon	75, 000		1, 926, 665	2, 001, 665
Blackspotted trout			81, 040	81, 040
Rainbow trout			24, 125	24, 125
Steelhead trout			2, 175	2, 175
Duckabush, Wash.:				
Chum salmon		4, 762, 900		4, 762, 900
Silver salmon			89, 670	89, 670
Quilcene, Wash.:				
Chinook salmon			18, 635	18, 635
Chum salmon	1, 369, 000	2, 832, 000	141, 170	4, 342, 170
Silver salmon			124, 495	124, 495
Sockeye salmon			41, 520	41, 520
Blackspotted trout			90, 545	90, 545
Brook trout			53, 000	53, 000
Rainbow trout			1, 030	1, 030
Steelhead trout			39, 020	39, 020
Rochester, Ind.:				
Black bass, largemouth			1, 255, 225	1, 255, 225
Black bass, smallmouth			37, 070	37, 070
Rock bass			37, 600	37, 600
Catfish			4, 340	4, 340
Crappie			6, 750	6, 750
Sunfish			684, 100	684 100
Yellow perch			2, 590	2, 590
Rochester, N. Y.:				
Black bass, largemouth			10, 000	10, 000
Black bass, smallmouth			6, 200	6, 200
Brook trout			37, 335	37, 335
Loch Leven trout			160, 425	160, 425
Rainbow trout			97, 040	97, 040
Carpenter's Brook, N. Y.:				
Brook trout			31, 035	31, 035
Loch Leven trout			3, 320	3, 320
Rainbow trout			30, 515	30, 515

Stations and substations operated and the output of each, fiscal year 1939—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Saratoga, Wyo.:				
Blackspotted trout			415, 830	415, 830
Brook trout			474, 930	474, 930
Lake trout			14, 700	14, 700
Rainbow trout			268, 750	268, 750
Spearfish, S. Dak.:				
Brook trout			117, 785	117, 785
Blackspotted trout			22, 000	22, 000
Loch Leven trout			52, 500	52, 500
Rainbow trout	58, 140		660, 660	718, 800
Springville, Utah:				
Black bass, largemouth			1, 095	1, 095
Blackspotted trout			574, 720	574, 720
Brook trout			344, 530	344, 530
Rainbow trout	100, 000		652, 595	752, 595
Sockeye salmon			188, 080	188, 080
Grayling	275, 000			275, 000
Bear Lake, Utah:				
Blackspotted trout			90, 440	90, 440
Brook trout			173, 480	173, 480
Rainbow trout			79, 500	79, 500
Chum salmon			94, 080	94, 080
Sockeye salmon, landlocked			125, 955	125, 955
Uvalde, Tex.:				
Black bass, largemouth		393, 950	357, 290	751, 240
Catfish			1, 200	1, 200
Crappie			240	240
Rio Grande perch			162, 060	162, 060
Sunfish			517, 505	517, 505
Fort Worth, Tex.:				
Black bass, largemouth			74, 900	74, 900
Warmouth bass			1, 100	1, 100
Crappie			7, 000	7, 000
Catfish			2, 500	2, 500
Sunfish			24, 350	24, 350
San Angelo, Tex.:				
Black bass, largemouth			146, 600	146, 600
Crappie			3, 000	3, 000
Sunfish			120, 395	120, 395
San Marcos, Tex.:				
Black bass, largemouth		285, 700	161, 840	447, 540
Rock bass			5, 300	5, 300
Catfish			4, 900	4, 900
Crappie			15, 550	15, 550
Rio Grande perch			13, 700	13, 700
Sunfish			92, 055	92, 055
Walhalla, S. C.:				
Brook trout			387, 605	387, 605
Rainbow trout			261, 970	261, 970
Welaka, Fla.:				
Black bass, largemouth		88, 000	284, 920	372, 920
Sunfish			11, 600	11, 600
White Sulphur Springs, W. Va.:				
Black bass, largemouth			2, 000	2, 000
Rock bass			1, 000	1, 000
Brook trout			353, 935	353, 935
Loch Leven trout			16, 335	16, 335
Rainbow trout	392, 000		102, 140	494, 140
Woods Hole, Mass.:				
Flatfish		568, 530, 000		568, 530, 000
Mackerel		11, 060, 000		11, 060, 000
Wytheville, Va.:				
Black bass, smallmouth			3, 710	3, 710
Rock bass			14, 500	14, 500
Brook trout			32, 190	32, 190
Rainbow trout	708, 000		461, 575	1, 169, 575
Pike perch		400, 000		400, 000
Sunfish			33, 050	33, 050
Harrison Lake, Va.:				
Black bass, largemouth		83, 500	4, 670	88, 170
Crappie			5, 485	5, 485
Shad		5, 174, 220		5, 174, 220
Sunfish			64, 370	64, 370
Norris, Tenn.:				
Black bass, largemouth		63, 000	4, 225	67, 225
Kentucky bass		2, 000	1, 100	3, 100
Pike perch		450, 000		450, 000
Rainbow trout			250	250
Sunfish			2, 500	2, 500
Smokemont, N. C.:				
Brook trout			142, 005	142, 005
Rainbow trout			184, 545	184, 545

Stations and substations operated and the output of each, fiscal year 1939—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Yellowstone Park, Wyo.:				
Blackspotted trout	26, 258, 290		5, 895, 445	32, 153, 735
Grayling	1, 524, 800	4, 195, 270		5, 720, 070
Jackson, Wyo.:				
Blackspotted trout	100, 000	469, 620	101, 020	670, 640
Brook trout			13, 200	13, 200
Lake trout			7, 500	7, 500
Rainbow trout			70, 310	70, 310
Grayling		101, 480		101, 480
Total	5, 824, 802, 070	2, 115, 405, 660	84, 332, 955	8, 024. 540, 685

EGG COLLECTIONS

In spite of a slight reduction in hatchery output for 1939 the collections of eggs for that period exceeded the 1938 figure by some 355 million. This is explained in part by the fact that a considerable number of fingerlings, particularly of salmon, are being held for distribution during the succeeding fiscal year, and the 1939 distribution was in part achieved from the 1938 egg collections. The greatest increase was in the collection of cod eggs, which were increased by approximately 825 million, and in the pike perch work, where the increase was about 710 million. Mortalities in hatching these eggs may vary widely, with the consequent possibility of a reduction in the production of fry in spite of an increased take of eggs.

Comparison of egg collections, fiscal years 1938 and 1939

Species	1938	1939	Species	1938	1939
Shad	27, 523, 000	48, 257, 000	Yellow perch	331, 425, 000	301, 668, 000
Whitefish	123, 711, 000	52, 464, 000	White perch	6, 400, 000	8, 300, 000
Chinook salmon	41, 336, 400	63, 124, 000	Cod	2, 372, 773, 100	3, 197, 555, 700
Chum salmon	16, 187, 000	11, 196. 800	Haddock	1, 037, 330, 500	1, 178, 993, 700
Silver salmon	1, 300, 000	3, 080, 000	Pollock	2, 116, 821, 200	1, 560, 497, 100
Sockeye salmon	3, 180, 000	2, 969, 000	Flatfish (flounder)	1, 402, 749, 000	1, 318, 397, 100
Humpback salmon	5, 111, 000		Mackerel		11, 060, 000
Rainbow trout	28, 241, 300	30, 155, 900	Lake herring	2, 200, 000	5, 325, 000
Blackspotted trout	31, 048, 500	42, 898, 600	Glut herring	2, 960, 000	8, 140, 000
Loch Leven trout	1, 777, 500	899, 500	Striped bass	646, 000	3, 413, 000
Lake trout	1, 536, 900	2, 852, 000	Carp	329, 200, 000	
Brook trout	31, 061, 800	11, 576, 700	Buffalofish	387, 445, 000	78. 681, 500
Steelhead trout	1, 588. 800	3, 386, 900	Lobster	8, 444, 000	12, 991, 600
Grayling	5, 837, 000	5, 117, 600			
Golden trout		18, 200	Total	8, 574, 205, 000	8, 929, 774, 000
Pike perch	256, 371, 000	966, 755, 100			

NOTES ON OPERATIONS

COMMERCIAL SPECIES

Pacific salmon.—It is recognized that the run of chinook salmon, which is the most valuable species of the Pacific salmon in the Columbia and Sacramento Rivers, is facing a very serious situation because of the construction of dams on these rivers. Millions of dollars are being spent by the Pacific Coast States and the Federal Government to maintain the run of this species. During the year 1939 the output of chinook salmon fingerlings from the Bureau's hatcheries was approximately 14 million over that of 1938.

In the Puget Sound territory, the Birdsview (Wash.) station handled fewer eggs and fish than during the previous season but reared the greater percentage of its output to a larger size before releasing them. This recession was largely due to the fact that no humpback salmon eggs were taken, whereas last year 4,305,000 were collected during the largest run of this species in the Skagit River in 25 years. The output comprised 4 species of trout and 3 varieties of Pacific salmon. No chum salmon were propagated. Twenty small concrete rearing ponds which had been in use since the origin of the station were dismantled, and an entire new concrete pond system consisting of 8 ponds 13½ feet wide by 56 feet long was constructed. The capacity of each pond is about 250,000 2- to 3-inch fish. Cottage No. 1 was renovated and all other buildings repaired and painted. A new machinery shed 24 by 60 feet, with open front, was constructed for use in storing station machinery and equipment.

The total number of eggs collected by the Clackamas (Oreg.) station and its auxiliaries amounted to approximately 22,700,000, as compared with 20,000,000 during the past year—an increase of nearly 12 percent. This total was due to the abnormally large collections of fall chinook salmon eggs at the Battle Creek and Mill Creek (Calif.) substations. The collection of spring chinook salmon eggs was below normal at both the Clackamas and Butte Falls units. The low collection of eggs at the latter point is ascribed to the late installation of the headrack across Rogue River, which was due to the late runoff of snow water from the upper sources of this stream. A new permanent rack and trap in Butte Creek yielded more than 1½ million steelhead trout eggs. However, the collection of silver salmon eggs from this body of water proved a complete failure. The Clackamas station supplemented its salmon work by handling brook and rainbow trout. The pond system at the Delph Creek rearing station was repaired, rearranged and enlarged. Construction of a frame hatchery building was started. At Clackamas the old combination workshop and dwelling was remodeled. A laboratory building, 32 by 45 feet, for use by the Division of Scientific Inquiry, was practically completed. A chlorinating system was installed for the purpose of sterilizing the water supply before it enters the two reservoirs with the expectation that previous heavy mortality of fish would be eliminated. The two residences under construction at the Butte Falls station were completed during the year.

The development of the hatchery at Carson, Wash., was continued under the auspices of the P. W. A. and W. P. A. and with the cooperation of the United States Forest Service. This unit does not as yet have a pond system of sufficient capacity to rear its fish to a large size before releasing them. Plans have been drawn up for increasing the pond space. Chinook salmon and brook, rainbow, and black-spotted trout were handled during the year. All of the trout were assigned to the Forest Service for the stocking of waters under the control of that agency.

Due to the development of the Bonneville Dam on the Columbia River, the Little White Salmon and Big White Salmon substations had to locate new seining grounds and clear the debris from such areas in order to facilitate the capturing of adult salmon. Nevertheless, the former station collected 20,443,000 chinook salmon eggs, which is a normal take, and the latter unit secured 18,250,000 eggs of this species, which was its largest collection since the season of 1932. While the Little White Salmon station was solely engaged in the propagation of chinook salmon, the Big White Salmon station augmented its salmon work by handling brook and rainbow trout. New buildings were constructed at both points and numerous repairs made to old structures.

The Quinault (Wash.) station collected its quota of sockeye salmon eggs for hatching, which is 2,000,000, and secured an additional 200,000 for transfer to the Washington State Fisheries Department. This unit also handled chinook and silver salmon and steelhead, rainbow, brook, and blackspotted trout. The eggs for all species propagated, except the latter two, were collected locally. Approximately 3,350,000 eggs were handled and the resultant fish were all reared to fingerlings before being liberated. The Humptulips trap, which is located on the West Fork of Humptulips River, was completed and operated during the chinook salmon and steelhead trout runs. Other construction work consisted of the following: Food room rebuilt, hatchery building reroofed, new office in hatchery constructed, large cold-storage room built, new concrete walks and stairways poured, and grounds landscaped.

The major fish-cultural activity at the Duckabush and Quilcene (Wash.) substations was the propagation of chum salmon. Due to stream-improvement work at the mouth of the Big Quilcene River at the height of the spawning season of the early run, the latter station was unable to secure any chum eggs from this source. However, the Duckabush unit collected 2,870,000 eggs from the early run in Duckabush River and both stations secured from the late run in the Walcott slough field more than 8,000,000 eggs. The spawned-out adults were transferred to the Quilcene dehydrating plant, and the dry salmon-meal was utilized at a number of trout hatcheries for fish food. The Quilcene hatchery supplemented its salmon work by concentrating on the production of trout fingerlings during the summer months for the stocking of local waters. At this station a new building was constructed and the necessary troughs and equipment were installed for conducting pathological studies.

MARINE SPECIES

The Boothbay Harbor (Maine) station collected 1,419,860,000 cod, 517,305,000 pollock, and 417,832,000 haddock eggs which, after being fertilized, were liberated upon the natural spawning grounds of the respective species. From 670,000,000 flounder eggs incubated in the hatchery, a hatch of 90 percent was attained. The number of eggs of this species handled was in excess of last season's by 76,000,000. In cooperation with the Sea and Shore Fisheries Commission of Maine, lobster culture was continued. Near the Bureau's hatchery this agency constructed a rearing station that is equipped with 500 lobster-rearing compartments. It is believed that when all details have been completed this unit will have facilities for rearing 1,000,000 lobsters to the fourth larval stage. There were on hand at the beginning of the year 327,400 lobster fry from which a number of fourth-stage lobsters were raised and liberated at different points along the coast of Maine. During the spring of 1939, 3,915 adult egg-bearing lobsters were secured. Some of these adults were placed in cod boxes which had been rearranged in order that the young lobsters could hatch normally. Eggs were stripped from the others and placed in McDonald hatching jars for incubation. On June 30, there had been hatched 3,899,000 lobster fry, of which 1,045,000 were placed in the rearing station, the remainder being liberated.

On September 21, 1938, the Woods Hole (Mass.) station was struck by a hurricane and tidal wave which destroyed windows, lattice work, slate shingles on the roofs, docks, sea wall, salt-water suction pipe line, and other property. The wooden portion of the east dock and sea wall was razed. Considerable time and funds will be required to rehabilitate this unit. The new suction line has been installed and other necessary repairs were made in order that the station could carry on its flounder work. Approximately 633,987,000 flounder eggs were collected and 568,530,000 fry were hatched and distributed. Approximately 50 percent of these fry were liberated in the coastal waters of Massachusetts—the remainder being planted along the coasts of New Jersey and Rhode Island, and in Long Island Sound and Narragansett Bay. Through the cooperation of the local commercial fishermen, there were collected 13,484,000 mackerel eggs from which 11,060,000 fry were hatched and liberated in Vineyard Sound and Buzzards Bay.

The fish-cultural activities at the Gloucester (Mass.) station consisted of the propagation of pollock, flounder, haddock, cod, and lobster. There was a noticeable decrease in the production of the three former species, whereas there was a slight increase in the number of cod handled. Several spawn-takers were assigned to commercial fishing vessels for the purpose of collecting pollock, haddock, and cod eggs, a large percentage of which, after fertilization, were planted on the spawning grounds. The hatchery was also operated to capacity when eggs were obtainable. The total number of eggs collected was slightly in excess of 3½ billion. The lobster-cultural work was carried on in cooperation with the Massachusetts Department of Conservation, the same as last year. Four hundred and ten seed lobsters produced 3,221,600 eggs which were incubated in McDonald hatching jars. Due to insufficient feeding equipment, it was necessary to liberate the greater percentage of the young lobsters in the third larval stage. Under the auspices of the P. W. A. and W. P. A., the buildings and equipment at this point were reconditioned and overhauled. Major changes consisted of the following: 15,000-gallon storage tank constructed, main hatchery building, storehouse and workshops reroofed, extension constructed on southwest side of boiler room to provide additional space for new boiler, new boiler installed as a replacement for the obsolete boiler, wharf repaired, new concrete floor poured in hatchery building, and all buildings given one coat of paint.

GREAT LAKES SPECIES

As Michigan maintains a closed season during the height of the spawning period for whitefish and lake trout, the collection of eggs of these species by the Duluth (Minn.) station was restricted to collecting fields in that section of Lake Superior not controlled by the State of Michigan. All lake trout and whitefish eggs obtained in Michigan waters were taken either before or after the closed season, and were of an inferior quality, with a resultant poor hatch. About 5,325,000 lake herring eggs were obtained from commercial fishermen from which

3,000,000 fry were liberated in Minnesota waters. The collecting of pike perch eggs was carried on in cooperation with the United States Forest Service. From 21,500,000 eggs of this species collected, 13,640,000 fry were distributed. Brook, rainbow, and brown trout eggs were hatched at this station for the stocking of local trout waters and for the Cascade rearing ponds in the Superior National Forest. The low temperature of the hatchery water supply induced high mortality among the trout eggs. Repairs and improvements were made to buildings and equipment by P. W. A. and W. P. A. workers.

Because of the high water temperatures which existed at the normal spawning period, the whitefish spawning season on Lake Erie in the vicinity of the Put in Bay (Ohio) hatchery was unusually late. However, more than 48,200,000 whitefish eggs were collected and placed in the hatchery. On December 29 the water-supply line to the hatchery froze, necessitating the planting of all eggs in the lake. There were 943,340,000 pike perch eggs collected from the 6 fields worked—one of the largest collections in the history of this station. The most productive field was at Port Clinton, where more than 500,000,000 eggs were secured. The propagation of both species was carried on in cooperation with the Ohio Conservation Division.

Due to the shortage of funds, the Cape Vincent (N. Y.) station was unable to send spawn-takers into the field. Therefore, it was necessary to depend upon the local commercial fishermen for the supply of lake trout and whitefish eggs. There were 1,108,800 lake trout eggs handled, while 70,000 whitefish eggs of poor quality were received. The major activities are the propagation of game fish, particularly smallmouth black bass, and the operation of substations for the rearing of trout. This phase of the work is discussed elsewhere in this report. At the Swanton (Vt.) substation all buildings were reroofed and painted, but there were no fish-cultural activities carried on. This unit has, in previous years, handled pike perch and yellow perch.

ANADROMOUS SPECIES, ATLANTIC COAST

The Edenton (N. C.) hatchery surpassed its 1938 collection of shad eggs by taking 11,134,000 from which 7,134,000 fry were hatched. All of these fry were planted in Albemarle Sound and its tributaries, with the exception of 500,000 which were planted in hatchery ponds for investigation and study. A culture of daphnia was maintained in the ponds until the shad were seen swimming along the shoreline, at which time artificial food was given them. The food consisted largely of ground fresh fish and shrimp meal. A new field was located on the other side of the sound near Mackeys, from which 8,300,000 white perch eggs were collected. A limited number of yellow-perch eggs were secured. The Edenton station propagates pondfish for the stocking of inland waters, supplementing its work with the commercial species. This unit was favored with W. P. A. and P. W. A. projects, which resulted in the completion of several ponds, a residence and other improvements. The Weldon (N. C.) substation was operated in cooperation with the Conservation Department of North Carolina for the hatching of striped bass, and 3,413,000 eggs of this species were collected.

The Orangeburg (S. C.) station operated an auxiliary hatchery on the Edisto River near Jacksonboro for the propagation of shad.

There were 1,876,000 eggs collected, from which 1,534,000 fry were liberated in the Edisto and Ashepoo Rivers. While this number does not equal the records of previous seasons, it does represent an increase of one-half million fry over last year.

At the Fort Belvoir (Va.) hatchery, located on the Potomac River, the main fish-cultural activities were the collecting and hatching of shad and yellow-perch eggs. The collection of shad eggs exceeded that of last season by more than 10 million, while there was a slight recession in the number of yellow-perch eggs secured. A one and one-half story, five-room, brick-veneer residence was constructed, and the marine railway and carriages were rebuilt.

GAME-FISH PROPAGATION

One would consider practically the entire output of the Bureau's hatcheries as coming within this category, since all species propagated, except lobster, whitefish, herring and shad, are at some time or place sought by sportsmen.

Never in the history of the Bureau have the demands been so great for game fish. This may be ascribed in part to the large number of reservoirs constructed by the Department of Agriculture in its soil-conservation program, the impounding of large bodies of water by hydro-electric projects, the flooding of areas by the Bureau of Biological Survey to create migratory bird refugees, and to the prosecuting of stocking programs formulated by various Federal and State agencies. However, the innate popularity of angling among all classes is probably the most comprehensive explanation for the demand.

The following data cover the activities of the stations handling the families Centrarchidae and Cichlidae and the species of the Salmonidae found largely in inland waters.

ROCKY MOUNTAIN TERRITORY

Due to adverse weather during the spawning season, and water shortage throughout the summer, the output of pondfish from the Dexter (N. Mex.) station was below normal. Approximately 121,000 of the fish distributed ranged from 5 inches in length to legal size. In cooperation with the New Mexico Department of Game and Fish, a stocking program was formulated for the waters of that State. This program was adhered to as much as possible, although a portion of Dexter's production was utilized for the stocking of Arizona, Colorado, and Texas waters. Heretofore, predatory birds have devoured large numbers of this unit's brood stock each winter and a network of wires was attached to cables over some of the ponds in order to frighten such visitors. A concrete cistern of 30,000 gallons capacity, for storing water for domestic use, was constructed. The metal fish tanks were removed from the holding house and replaced with 14 concrete tanks. All station buildings were repaired and painted and a large cactus garden was planted near the entrance to the station.

The output of fish from the Santa Rosa (N. Mex.) substation was practically the same as that of the previous season. A number of choice smallmouth black bass fingerlings were saved out of last year's hatch, and it is anticipated that the 1940 output of this species will be greatly increased. The number of food organisms produced in the ponds appeared to justify the expense involved in fertilizing them with a mixture of sheep manure, superphosphate, and cottonseed meal. This unit's pond system was increased by 6 ponds during the year.

At the Elephant Butte (N. Mex.) station all buildings and ponds were completed by the Reclamation Service and placed in operation. From 13.4 acres of water more than ½ million fingerling pondfish were produced, of which 373,750 were largemouth black bass. A stock of crappie, which are reported to have reached a size of 3 pounds in the warmer waters of the Pecos Valley watershed, was secured for the purpose of introducing a large-size strain of this species into the waters of the Rio Grande.

In the Utah field the Springville station distributed 1¾ million fingerling fish and shipped 980,000 trout eggs to other hatcheries. The production of largemouth black bass was negligible. Experiments were conducted to determine the effect of diet upon the fertility of rainbow trout eggs. The old wood-pipe hatchery-water supply line was replaced with a 10-inch asbestos-wrapped 12-gage spiral-welded steel line.

At the Bear Lake (Utah) substation 5 species of trout and chum salmon were handled. This unit collected 1,174,000 eggs from local trap sites and received 657,820 eggs from other stations. In addition to the construction of a new residence, all buildings were painted by W. P. A. and P. W. A. employees.

All buildings and ponds were completed at the Las Vegas (Nev.) unit. During the early spring this station secured an ample stock of brood fish from which 80,000 fingerling black bass were planted in Lake Mead prior to the close of the year.

On September 11, 1938, the Bureau took charge of the Clark Fork (Idaho) hatchery, which was constructed as a W. P. A. project sponsored by the Idaho Fish and Game Department on land donated by the Bonner County Sportsmen's Association. Gratifying results were obtained from the eggs handled and it was possible to liberate more than ½ million fingerling silver and blackspotted trout during the latter part of the year.

In the Colorado territory the Leadville station continued to cooperate with local parties in the collecting of trout eggs. The Bureau received several million eggs from such sources at a nominal cost, thereby eliminating the necessity of maintaining a brood stock at this unit. Several thousand trout were transferred to the Crystal Lake Nursery to be reared to a larger size before liberation. There were 4,300,000 rainbow eggs collected from Eagle Nest Lake during April and the early part of May. More than 1 million of these eggs were assigned to the New Mexico Department of Game and Fish for hatching and subsequent planting in the waters of the northern part of the State. The hatchery building and 2 cottages at Leadville were reroofed and a two-car garage was built. A new cottage was constructed at Turquoise Lake from lumber milled by W. P. A. labor.

An average production of fingerling trout was obtained at the Creede (Colo.) substation. Due to the scarcity of spawners, the collection of brook and rainbow trout eggs from Lake San Cristobal was materially below that of 1938. However, the eggs obtained were of very high quality, eyeing up to 98 and 99 percent respectively. Three old concrete ponds were dismantled and 4 new concrete ponds were constructed in the same area. A two-car garage was built and the river bank in front of the hatchery building was riprapped with rock.

In the Idaho field the number of eggs taken from the brood stock at the Hagerman station was disappointing, due to the large number of barren females. The reason for this large percentage of barren females is not definitely known, but it is ascribed to diet. Experiments are being conducted to ascertain if this assumption is correct. Approximately 1 million large fingerling trout were produced. The rearing-pond system was greatly increased during the year by W. P. A. and P. W. A. employees.

The substation at Salmon, Idaho, which heretofore had been operated on a seasonal basis, was operated during the entire year in cooperation with the Idaho Fish and Game Department primarily for handling the rainbow eggs collected at Williams Lake and other local waters. Extensive repairs and improvements, including the rearranging of the hatching and rearing equipment in the hatchery, were made during the winter.

The distribution of rainbow trout from the Bozeman (Mont.) station was somewhat limited, due to the high mortality among this species during the latter part of the previous year. Normal success was attained with the other species of trout and grayling handled. Elk carcasses received from Yellowstone Park were utilized for fish food. This station was the beneficiary of P. W. A., W. P. A., and N. Y. A. projects which made possible extensive repairs and improvements to buildings, grounds, and equipment.

The Glacier Park (Mont.) substation received 2,501,480 black-spotted trout and 400,000 rainbow trout eggs from the Yellowstone Park unit and planted the resultant fish in the advanced fry stage in Park waters. The water-temperature range is too great for successful hatchery operation at this point. In view of this and the need for a new and improved hatchery for producing larger fish for the stocking of waters of the Glacier National Park, an alternative site was located 2 miles west of Creston. This unit, as planned, will consist of a 48-trough hatchery building of frame construction, containing an office, laboratory, 2 lavatories, and a storage room. There will be 12 concrete raceway ponds, each 107 by 10 feet; 10 Foster-Lucas concrete ponds of oval shape, each 56 by 13½ feet; 1 utility building and several residences. The grounds are to be landscaped and provision will be made for a picnic area which will be supervised by the Park Service. The construction of this hatchery was started on March 1, 1939, under the auspices of the W. P. A., P. W. A., and N. P. S., with the Bureau furnishing technical advice. Due to adverse weather conditions and unforeseen constructional difficulties the work is somewhat behind schedule, but it is anticipated that this station will be ready for operation in the spring of 1940.

The production of the Ennis (Mont.) substation was largely utilized in the restocking of waters of the Madison Valley watershed in an effort to reestablish the excellent sport fishing of the past years. The scarcity of adult rainbow and Loch Leven trout ascending the Madison River during the spawning season was more acute than ever. Consequently, this station had to rely on other sources for practically all of the eggs of these species. The major construction activities were erection of a four-room cottage, the extension of the water-supply main, installation of a hydroelectric turbine and generator unit, the installation of a steam-heating plant in the hatchery building, and the fencing of station grounds.

Although the bass production was small, the total output of the 4 species of fingerling fish handled at the Miles City (Mont.) substation was larger than during either of the 2 preceding years. The small production was attributed to an inadequate supply of mature brood fish and the delay in harvesting, which was caused by very hot weather prevailing after a large amount of the water had been drawn from the large lake. However, the large size of the fingerling bass collected compensated for the small number taken. The large number of reservoirs built by the Farm Security Administration in this section of the country is creating a bigger demand for pondfishes, especially catfish, and special effort is being made to increase the production of this species. From the Nebraska Conservation Commission 1,900 adults, 10,000 fry, and 40,000 channel catfish eggs, green and eyed, were received in exchange for grayling eggs.

Inasmuch as the work at the Yellowstone Park station covered the midsummer months extending into parts of 2 fiscal years, the data furnished here cover the season of 1938. Because of high-water conditions, much difficulty was experienced in maintaining the fish traps. For instance, the trap in Pelican Creek, which was by far the largest producing trap in 1937, could not be operated from May 25 to June 10 because of extremely high water. Notwithstanding these conditions, the take of eggs was more than 37 million, which is considered an average collection although it was approximately 10 million less than during the season of 1937. There was an increase in the number of fish reported as being taken from the waters of the Yellowstone Park this year, while the number of Park visitors was slightly less than last year. In 1938 there were 163,859 fish reported at the checking stations, while the number reported in 1937 was 135,654.

The Jackson Hole (Wyo.) substation, which was operated on a seasonal basis, produced approximately 870,000 blackspotted, lake, rainbow, and brook trout, and grayling for stocking waters of the Grand Teton National Park and the Teton National Forest. A C. C. C. project permitted development of a number of improvements, including the repairing of 4 circular concrete ponds, the construction of 2 rectangular ponds, and the landscaping of station grounds.

A new three-stall garage was constructed and all buildings were painted at the Saratoga (Wyo.) station. The pond system was enlarged by the construction of 2 concrete ponds 100 by 10 feet, 2 concrete ponds 60 by 6 feet, and one dirt pond with concrete ends. Fish-cultural work was carried on along usual lines and normal success was attained in the production and distribution of trout fingerlings.

The Baker Lake (Wash.) station, which was formerly used for the propagation of salmon, was remodeled for the purpose of rearing trout to stock Baker Lake and tributary waters. During the early part of the year C. C. C. enrollees from a local camp assisted in the laying of pipe lines, rebuilding the intake dam, etc. This unit was operated on a fish-cultural basis only from June 1 to June 30. The fish which were received by transfer from other stations are being reared to a larger size before planting. Consequently, no distribution was made from this hatchery during the fiscal year.

From the 12 circular rearing ponds operated at the Spokane, (Wash.) substation, approximately 230,000 large fingerling brook, rainbow, and blackspotted trout were distributed. All except 6,000 of these fish were planted by the Conservation Departments of Washington and Idaho. A four-room, frame, one-story cottage, with concrete basement, was constructed. A concrete foundation for a hatchery building 38 by 54 feet was poured and fill made within the foundation walls preparatory to the laying of a concrete floor. At present, this station utilizes trough space in the local State hatchery for incubating its trout eggs.

As there was no stock of eggs or fish on hand at the Mount Rainier (Wash.) substation at the beginning of the year, the entire unit, including water-supply lines, ponds, troughs, feeding tanks, and all fish-cultural tools and appliances, was thoroughly sterilized with calcium hypochlorite to eradicate fish parasites and diseases which had prevailed. When the shipments of eggs were received, they were sterilized by submerging them in a 1:2,000 solution of acriflavine for 20 minutes before they were placed in the hatching troughs. As a result of this precaution, the stock of fish at this hatchery remained free of all diseases during the year. This station collected rainbow trout eggs from Mowich Lake and received approximately 850,000 eggs of rainbow, brook, and blackspotted trout from other points. The greater percentage of the resultant fish were planted in the waters of the Mount Rainier National Park and the Snoqualmie National Forest.

The Spearfish (S. Dak.) station installed 4-foot red and green Neon lights under the surface of the water in some of the trout ponds to attract insects for fish food. One cottage was constructed and many repairs and improvements were made to the buildings, equipment, ponds, and water-supply system. The egg-take from the station brood stock was only about 50 percent of that of the past season, due to the large number of barren females among the rainbows and the heavy mortality of the Loch Leven stock prior to the spawning season. The small laboratory continued to be a very important unit at this station. Through weekly microscopic examination of all lots of fish many diseases are diagnosed and checked before they cause serious trouble.

NEW ENGLAND TROUT STATIONS

Owing to the appearance of furunculosis the latter part of last year, and the consequent disposition and destruction of all fish on hand, fish-cultural operations at the National Forest (N. H.) station were suspended until the receipt of eggs during the fall of 1938. The States of Vermont and New Hampshire furnished 1 million brook trout eggs with the understanding that the Bureau would provide food equal to their value. To supplement these eggs, approximately 1½ million were collected from yearling and 2-year-old fish held in the Whitefield rearing ponds of the New Hampshire Fish and Game Department. Repairs and improvements were prosecuted by W. P. A. and P. W. A. workers. The pond system was enlarged by the construction of additional raceways 3 feet wide by 165 feet long, in three equal sections with falls between. These ponds are arranged in such a way that four different water supplies may be utilized if necessary.

The hurricane which raged through the New England States on September 21 did little damage to the St. Johnsbury (Vt.) station other than blowing down some of the trees in the pine plantation. With the assistance of the W. P. A. and P. W. A. much valuable work was accomplished, not only in repairs to ponds, buildings, drainage lines, water supply, etc., but by the addition of several new raceways. A concrete intake dam in Sleepers River was constructed to replace an obsolete plank structure, thereby assuring a constant water supply at all times. As usual, the major fish-cultural activity was the hatching of approximately 1½ million brook trout eggs. At the beginning of the year the entire stock of brown trout and landlocked salmon fingerlings was wiped out by the parasite *ichthyophthirius multifilis.* The fish-cultural work of this station is carried on in cooperation with the Fish and Game Service of Vermont.

The Pittsford (Vt.) station continued its experiments in selective breeding of trout and conducted various other investigations. This year the adults yielded eggs at the rate of 1,424 per pound of fish. As the average fish-culturist recognizes 1,000 eggs per pound of trout as the normal production, the effect of selective breeding is obvious. This station was favored with W. P. A. and P. W. A. projects for the repairing and improving of buildings, equipment, and roadways.

The Craig Brook (Maine) hatchery collected 4,300,000 brook trout eggs, of which number approximately 2½ million were shipped to other Bureau stations. Shipments of rainbow and lake trout eggs were received, from which several thousand fingerlings were distributed. In accordance with an agreement between the National Park Service and the Bureau, the Acadia National Park was allotted 185,000 large fingerling brook trout for the stocking of waters under its control. Repairs and improvements were made to buildings, ponds, drainage and supply lines, roadways, etc., by P. W. A. and W. P. A. workers.

In order to facilitate the repairing of old ponds and enlarging the pond system, the Hartsville (Mass.) hatchery disposed of its brood stock of trout. Consequently no eggs were taken at this point. Approximately 400,000 brook and 27,000 rainbow trout fingerlings, ranging in size from 1½ to 4½ inches, were distributed. In cooperation with the State of Connecticut, 773,000 smallmouth black bass fry were collected from Wangum Lake; one-half of which were assigned to the State of Connecticut.

As the Nashua (N. H.) station was struck by a hurricane in September, a large amount of time has been spent by the personnel in rehabilitating it. In addition to this work, a garage and 4 concrete ponds were constructed. This unit suffered high losses among all species of fingerling and yearling trout the latter part of the year.

COMBINATION TROUT AND PONDFISH STATIONS

Although most of the establishments in this category have heretofore been primarily concerned with the propagation of trout, several of them have enlarged their facilities for the propagation of warm-water species. In some cases the production of spiny-rayed fishes is almost equal to the output of some of the smaller units which are exclusively engaged in the handling of pondfishes.

At the Lamar (Pa.) station the hatchery building was completed during October and the necessary equipment placed therein, enabling this unit to incubate trout eggs. More than 1 million brook, brown, and rainbow eggs were hatched. In addition to the furnishing of fish for rearing at the Ogletown substation, several thousand trout were allotted to conservation clubs to stock their nursery ponds. Nine ponds, ranging in size from ½ to 2 acres in area, for the propagation of warm-water fishes, were completed in time to be stocked with brood fish during the spring. C. C. C. enrollees assisted in the above construction work as well as in the landscaping of grounds and the building of roads.

The Northville (Mich.) station's combined output of trout and pondfishes was in excess of one million. Approximately 660,000 trout were delivered to 5 cooperative feeding stations, 2 of which are within the boundaries of National Forests. Several thousand trout were consigned to the conservation departments of Indiana and Ohio for the stocking of suitable waters in their respective States. New outlet kettles were constructed in the 9 warm-water fishponds, and the ponds were graded. The hatchery water supply was materially increased by the construction of a concrete retaining wall across the southwest side of the spring pond. After repairs and alterations were made to all station buildings, they were painted.

The Powder Mill Park (N. Y.) hatchery, which is operated in cooperation with the Monroe County Park officials, reared several thousand trout to legal size before releasing them. This station also handled smallmouth and largemouth black bass for the stocking of Monroe County waters.

The 65,000 trout liberated by the Carpenter's Brook (N. Y.) station, which is operated in cooperation with Onondaga County sportsmen, were all 5 to 7 inches in length. At the close of the year this unit was feeding more than 200,000 fingerling and yearling brook, rainbow, brown, and lake trout. No output of smallmouth black bass was recorded, as the ponds to be utilized for this species were not completed until during the fall months. Brood stock of this species was collected and placed in the ponds this spring.

The Manchester (Iowa) station collected 2,992,000 rainbow trout eggs of which 89 percent were eyed. All of these eggs, with the exception of approximately 200,000, were shipped to other Bureau and State hatcheries. The production of smallmouth black bass was negligible, which was ascribed to the stocking of the rearing ponds with forage minnows previous to the introduction of bass fry. A new dwelling was constructed and residence No. 3 was moved to a new location and provided with a basement. Two 25-foot circular concrete ponds were built and a new main-supply pipe line was laid from the spring to the hatchery.

In an effort to step up the production of warm-water fish at the Flintville (Tenn.) station, 5 new ponds were excavated. Four of these are approximately 1 acre in area, the other being 2 acres. This brings the number of ponds up to 16, with a total area of 17¼ acres. The reservoir from which these ponds receive their water supply was enlarged. From 250,000 eyed rainbow eggs received by transfer, sufficient fish were produced to meet the requirements for this species in that territory.

The most outstanding feature of the fish-cultural work at the Erwin (Tenn.) unit was the production of more than 1,000,000 pondfish. The output of trout was on a level with that of last year. A new residence was constructed and the pond system enlarged.

Although the total number of rainbow trout eggs collected at the Neosho (Mo.) station was approximately 570,000 less than last year, the number shipped, due to the superior vitality of the eggs, nearly equaled that of last season. The selected brood stock of rainbow trout produced 1,305 eggs per pound of fish. Due to favorable weather during the pondfish spawning season, the output of warm-water species was the largest in the history of the station. Two rectangular trout ponds east of the hatchery building were razed and replaced by 3 circular concrete ponds. A concrete roadway was built and considerable landscaping was accomplished by W. P. A. laborers.

At the Bourbon (Mo.) substation, which is operated on a cooperative basis for the sole purpose of producing rainbow trout eggs, there was a material increase in the yield.

The collection of rainbow trout eggs from the Wytheville (Va.) station's brood stock amounted to 2,152,000 green eggs, which was slightly less than the previous season when 2,237,000 were collected. Approximately 1,133,000 of these eggs were shipped to other Federal and State hatcheries. The production of brook trout was the lowest in recent years, due to a gill infection which practically wiped out this species. The smallmouth black bass yield was also negligible, due to sudden changes in the temperature during the spawning season. The output of bream and rock bass was normal. The fry resulting from the pike perch eggs received from the Put in Bay (Ohio) unit were liberated in New River. Both hatchery buildings were reroofed and approximately 3,000 feet of pipe were laid to the ponds which are utilized for propagating spiny-rayed fishes. A new six-car garage was constructed, and eight brood trout ponds were rebuilt.

The inferior quality of the rainbow and Loch Leven trout eggs collected at the White Sulphur Springs (W. Va.) hatchery was ascribed to the food fed the brood stock. Due to the rebuilding of ponds utilized for the propagation of warm-water fishes, the output of bass was insufficient to meet the demands in that locality. The painting of all buildings except the work shop was completed. A number of new troughs were constructed and installed in the hatchery building. At the close of the year the spring pond and supply ditch were being walled up with stone, and the surrounding grounds landscaped.

At the Leetown (W. Va.) station results in trout-cultural work this year were gratifying, both as to the size and numbers of fish produced. A total of 625,735 fingerling brook, brown, and rainbow trout, of which number approximately 70,000 were in excess of 5 inches in length, were distributed. However, the percentage of hatch obtained from the 3,244,000 trout eggs collected from the station's brood stock was very low. Several thousand trout were assigned to the Monongahela and George Washington National Forests for the stocking of waters within their boundaries. Experiments in the feeding of fish meal, cod liver oil, and kelp meal to trout were carried on in order to further test their value as fish food. Other experiments were made to determine the effects of over- and underfeeding of trout. The production of spiny-rayed fishes was quadruple that of last season. The experiments in the stocking of warm-water rearing ponds with black-head minnows were continued for the purpose of determining how many forage minnows should be stocked per acre of water, and the time of year that they should be introduced into the rearing ponds. Three new residences were completed, and a sewerage system, which is for the combined use of the residences and the new dormitory, was put into operation. Eleven ponds, 500 feet long by 50 feet wide, and a series of 15 small ponds, none of which was in excess of 150 feet in length, were excavated and part of them were placed in operation. A new 11-car garage with an oil-drain pit was built and a cold-storage room with a quick freeze compartment was constructed as an addition to the old garage building. In addition to the above construction work, pond outlet kettles were poured, drainage and supply lines were laid, old buildings were repaired and painted, and considerable landscaping was accomplished.

The output of trout from the Cape Vincent (N. Y.) station and its auxiliaries at Cortland, Watertown, and Barneveld was in excess of 1,500,000. Although the production of smallmouth black bass at Cape Vincent was 92,000, this number was inadequate to meet the demands in that locality. In order to increase the output of this species, additional ponds are being constructed. At the close of the year four were nearing completion and one other was partly excavated. At the Cortland unit the circular pools were completed and both hatchery buildings were enlarged.

The Lake Mills (Wis.) station established an all-time record in the production of pondfishes; largemouth black bass being the major species handled. The output of trout was normal, approximately 232,000 fingerling brook, brown, and rainbows being distributed for the restocking of waters in that vicinity. During the year, ponds were excavated as follows: 2 ponds 4 acres in area; 1 pond 1 acre in area; and 5 ponds ranging from ⅙ to ⅓ of an acre. Outlet kettles and the necessary supply and drainage lines were installed in these ponds. The exteriors of all buildings were given 2 coats of paint and the interior of the hatchery building was painted.

APPALACHIAN AND BLUE RIDGE TROUT STATIONS

The Smokemont (N. C.) station produced 326,000 rainbow and brook trout, ranging in size from 3 to 7 inches, for the stocking of waters in the Great Smoky Mountain National Park and the Cherokee Indian Reservation. A built-in refrigerator for the storage of fish food was constructed and the necessary refrigerating machinery installed.

The Pisgah Forest (N. C.) unit, which is located on the Davidson River in the Pisgah National Forest, reared its output of approximately 50,000 brook, brown, and rainbow trout to a large size before releasing them. Fishing records maintained for the season would indicate that better catches are now being made from the waters of the Pisgah Forest. This is attributed to the stocking and stream management programs formulated.

The Walhalla (S. C.) station conducted its fish-cultural activities along routine lines and attained normal success in the production and distribution of brook and rainbow trout fingerlings. A hydroelectric unit was installed to provide power and lights for station operations. The trout reared in the ponds at the Franklin (N. C.) and Clayton (Ga.) substations were liberated in the waters of the Nantahala and Chattahoochee Forests, respectively.

PONDFISH STATIONS

Although records indicate that there has been a larger number of pondfish distributed in previous years, a large percentage of such fish were obtained from rescue operations along the Mississippi River. The actual number of warm-water fish produced at the various hatcheries sets an all-time record. The largest increase was in the production of largemouth black bass. Notwithstanding the fact that weather and other conditions, over which there is no control, influence the production of pondfish, the principal requirement for a large output of bass and other warm-water species is space. Therefore, in an endeavor to properly stock waters which are suitable for such species, the Bureau is constructing new hatcheries, and pond acreage at the old-established units is being enlarged as funds will permit.

The total production of largemouth black bass, sunfish, and crappie at the Harrison Lake hatchery, located at Roxbury, Va., was practically the same as last year. Efforts are being made to increase the natural food by introducing aquatic plants in the ponds. Pond dikes were straightened, raised, and regraded, and grounds were landscaped by enrollees of a nearby C. C. C. camp.

For some unknown reason the production of each species, forage as well as game, handled at the Lake Park (Ga.) station was far below normal. As the vitality of the fish collected was low, there was high mortality in the holding shed and on some of the distribution trips. The Division of Wildlife of the State of Georgia distributed the larger portion of the fish produced at this unit, as well as those produced at the Warm Springs (Ga.) station. During the year the following four new buildings were constructed at Lake Park: Residence, two-car garage, holding shed, and a small office building. Roads were repaired, and two new bridges were constructed.

As the Louisville (Ky.) station was inundated in 1937, and practically all of the brood stock was lost, this hatchery's annual output is not, as yet, on a level with that for the years previous to the flood. The wild-brood stock collected from various sources is becoming acclimated and domesticated to pond conditions, and, with favorable weather conditions during the spawning season, the output of bass fry should have been greater. In addition to the propagation of smallmouth black bass, largemouth black bass, sunfish, crappie, and rock bass, this unit raised golden shiners and blackhead minnows for forage. A three-car garage and carpenter shop was constructed, and all buildings were repaired and painted. Two new ponds are being excavated. At the close of the year one pond was completed, except for the outlet kettle. The construction activities were carried on under the auspices of W. P. A. and P. W. A.

The Tennessee Valley Authority's hatchery at Norris, Tenn., which is operated by the Bureau, liberated its production of bass and bream in Norris Lake. From the 500,000 pike perch eggs furnished this unit from the Put in Bay (Ohio) station, 450,000 fry were hatched and planted in the lake.

From the Palestine (W. Va.) hatchery, which was operated in cooperation with the West Virginia Conservation Commission, 181,510 fingerling bass, bream, and crappie were distributed. This station was successful in securing a brood stock of channel catfish.

At the Orangeburg (S. C.) hatchery, and its nearby auxiliaries, the production of 1,009,185 fingerling pondfish exceeds that of any previous year. This output is a 94-percent increase over that of last season. Largemouth black bass and bluegill sunfish were the major species handled, while a limited production of redbreasted sunfish, red-eared sunfish, warmouth bass, catfish, crappie, and yellow perch was attained. The completion of a 900-foot section of the reinforced-concrete storm channel provides a canal the entire length of the pond system, thus eliminating hazards which greatly endangered the station ponds heretofore. A new one-story residence, consisting of six rooms and bath, was constructed. A storage shed and two garages were also constructed. The painting of all buildings was about 90 percent completed at the close of the year.

From 25 acres of water available for the production of fish at the Hoffman (N. C.) unit, 843,115 fish, of which all except 25,000 were fingerlings, were distributed. This output consisted of largemouth black bass, warmouth bass, sunfish, and crappie. In accordance with an agreement, several thousand of these fish were liberated in the ponds and lakes on the land utilization project in which this station is located. A site was cleared for the construction of 3 additional ponds, each of approximately 1 acre in area. One of the ponds was completed and considerable excavation work was done on the others. A combination holding and shipping shed, housing 4 concrete holding tanks, was constructed.

The output of fish from the Marion (Ala.) hatchery was the largest in the history of the station. The total output of largemouth black bass, bream, crappie, and rock bass was 3,228,390. Although some of the early bass eggs were lost on account of adverse weather conditions, the production of this species was in excess of 1,067,000 for the year. This station was unable to maintain a sufficient stock of crappie and rock bass and, consequently, the output of these species was inadequate to meet the demand. Twelve ponds, covering 16 acres, were added to the pond system. A well was drilled which produced 120 gallons of water per minute to furnish the necessary water for these ponds. A new holding shed is being constructed near this well in order to facilitate the handling of fish produced in the surrounding ponds. The levees on several of the old ponds were reinforced with dirt obtained from shallow areas. In addition to the above construction work, a number of repairs and improvements were made to buildings, roads, fences, drains, pond levees, etc.

Although the Cohutta (Ga.) station was under construction during the entire year, a limited production of smallmouth black bass, largemouth black bass, and Kentucky bass fry and small fingerlings was obtained for distribution during the spring. Six ponds were excavated during the period, which gives this station a total of 12 ponds. The office building, garage and workshop, holding house, residence, and pumphouse were completed. Grounds were cleared of underbrush and dead trees, and the areas around the buildings and pond embankments were sodded.

In spite of the fact that high winds prevailed at the Lyman (Miss.) station during the spring spawning season, this unit produced approximately 684,000 fingerling black bass and bream. The bass at this station grow very rapidly during the early part of the season, some attaining a length of 4 inches in 6 to 8 weeks. Owing to the various sizes of bream taken from the ponds when they were drained, it is believed that this species spawned at least 9 months of the year in this locality. By enlarging the existing ponds, the water acreage was increased approximately 8½ acres. All levees were regraded and seeded with Bermuda grass, and willows were planted to prevent erosion around embankments except where there was danger of the roots clogging drainage lines.

Seventeen ponds covering 11.83 acres at the Marianna, (Fla.) unit were completed during the fall of 1938. On filling these ponds with water it was found that 6, due to seepage through the bottoms, would not hold sufficient water for the production of fish. Therefore, the output of 114,000 fry and 92,650 fingerling bass distributed from this station during the spring represents the production obtained from 5.93 acres of water. Difficulty was also encountered in obtaining sufficient brood stock from local sources for properly stocking the ponds that were utilized. As there was an unusually heavy culture of daphnia in the ponds used, the fish showed a remarkable growth. At the close of the year preparations were being made to apply a waterproofing treatment to the bottoms of all ponds. All buildings were completed and the surrounding grounds landscaped.

The Tupelo (Miss.) station, which has a pond area of only 16½ acres, produced more than 850,000 bass and bream, of which all except 198,000 were fingerlings. While the output of fingerling bass per acre was 42,500, the bream production was below 17,000. A six-room cottage was constructed. Approximately 8 inches of dirt was removed from four of the pond bottoms to eliminate the growth of water lilies, which have hindered the production and collection of young fish.

Inasmuch as several of the ponds at the Warm Springs (Ga.) station were not in operation, because of the fact that new supply and drainage lines were being laid and pond banks were being repaired and widened, the output of fish was slightly less than that of last year. Nevertheless, this unit produced approximately one-half million bass and bream for distribution. Catfish were received from the Lake Park unit and redistributed to applicants. In addition to the above construction activities, all buildings were repaired and painted.

Although unfavorable weather conditions prevailed and the water in the ponds was turbid during the spawning season, the Mammoth Spring (Ark.) unit attained a new record in the production of smallmouth black bass, with an output of 237,000 fry and 150,000 fingerlings. In addition to this species, largemouth black bass, rock bass, and bluegill sunfish were handled. A five-room cottage was constructed and repairs were made to all buildings, the barn being converted into a two-car garage. New concrete kettles were poured in three ponds and the levees and bottoms to all ponds were repaired and graded.

The city of St. Louis, Mo., with the assistance of the W. P. A. and P. W. A., built at the Forest Park station a new stone structure consisting of living quarters, office, garage, workshop, and holding shed. Ten new lakes were built and several of the old lakes and lagoons were deepened, cleaned, and reconditioned. New outlets were constructed and a better water supply system arranged to each lake and lagoon section. Due to these activities some of the lakes were not on a productive basis. Nevertheless, this unit produced approximately

400,000 fingerling fish for distribution. This station has proved a very valuable addition to the Bureau, inasmuch as it furnishes fish for the stocking of waters which heretofore had to be supplied from some remote point.

At the Tishomingo (Okla.) station approximately 14 acres of additional ponds were constructed. The following stone structures were built at this point: Four-room residence, three-stall garage, tool shed, and oil house. A holding shed is also under construction. Shortage of rainfall lowered Pennington Creek, the source of water supply, to where it was not flowing enough to maintain the proper level in the ponds. However, the 1939 output of fish was 716,980 fingerlings. Efforts to propagate channel catfish were a failure.

At the Natchitoches (La.) station W. P. A. and P. W. A. workers were engaged throughout the greater part of the year in the excavating of new ponds, laying of drainage and supply lines, building of a fence, gravelling of roads, repairing old pond bottoms and embankments, and constructing outlet kettles. Nevertheless, the output of fingerling largemouth black bass, warmouth bass, and sunfish was in excess of the previous year's record.

In addition to distributing more than 1 million fingerling largemouth black bass, bluegill sunfish, Rio Grande perch, and channel catfish, the Uvalde (Tex.) station liberated approximately 400,000 bass fry in local waters. The 39 ponds, totalling 44 acres in area, were devoted to the propagation of game species of fish, and 12 ponds, about ⅙ acre each in area, for the handling of forage minnows. As the water at this hatchery contains certain chemicals, the steel water-supply lines were corroded to the point where it was necessary to replace them. At the end of the year approximately 85 percent of the lines had been replaced with composition pipe. An addition to the implement building was constructed and the exteriors of all station buildings were painted.

The output of fry and fingerlings from the San Marcos (Tex.) unit approximated normal figures. Several old buildings were razed and a new combination garage, shop, and storage structure was built. A small building was also constructed for the purpose of storing paint, oil and grease, and other highly inflammable supplies. All old station buildings were repaired and painted. Considerable work was done on ponds, grounds, levees, and roads.

From the brood stock of 4 species of fish handled at the San Angelo (Tex.) Station, more than ¼ million fingerling fish were distributed. Extensive daphnia culture was carried on during the spring months to produce food for the fry, and golden shiners were introduced in the rearing ponds when the bass were about 1½ inches long. A residence and double garage were constructed during the year. The pond system drainage line was completed. The exteriors of all buildings were painted, the grounds around the new buildings landscaped, and the station driveways were regraded.

At the Fort Worth (Tex.) station the output of sunfish and warmouth bass was in excess of that of last year, while there was a slight recession in the number of largemouth black bass, crappie, and catfish distributed. This station was enlarged by the acquisition of a site containing 31 acres, on which 10 ponds, covering approximately 14 acres, were excavated. All old pond embankments were repaired and the bottoms of 2 were regraded. New concrete outlet kettles were built in all ponds. The following buildings were constructed: Four-room cottage, garage and store building, oil and paint house, blacksmith shop, and holding shed. In addition to these activities the station property was fenced in, all buildings were painted, the drainage system was enlarged, roads were graded, and grounds were landscaped.

The Welaka (Fla.) station, which was received by transfer from the Farm Security Administration the latter part of last year, was favored with W. P. A. and P. W. A. projects for prosecuting extensive construction work. Complete individual supply and drainage systems were installed in eight ponds at the Beecher unit. New kettles were constructed in eight new 2-acre ponds, and pond bottoms were graded to allow sufficient drainage for collection of fish. There was installed a new supply and drainage system for the series of 24 one-acre ponds. Repairs were made to old residences. A four-car garage was constructed, a laboratory building was erected, and two 6-room stucco cottages were partially finished. Nevertheless, this unit distributed approximately 100,000 fry and 300,000 fingerling black bass as well as a limited number of sunfish.

At the Fairport (Iowa) station considerable repair work to pond bottoms, embankments, kettles, and supply and drainage lines was accomplished. For reasons previously mentioned, salvage work in this field was not necessary this year. As this unit is fully equipped to handle rescue work, it cooperated with the State Conservation Department and sportsmen's organizations in eastern Iowa in the collecting of fish from stagnant inland waters and liberated them in suitable waters. Gratifying success was attained in the culture of yellow and channel catfish.

In the Indiana field, the Rochester station established an all-time record in the production of pondfishes. The total output of all species handled at Rochester and the Argos auxiliary was in excess of 2 million—an increase of more than 1 million over last year. Further experiments in the culture of spoonbill catfish in ponds were undertaken at this hatchery, but the results were nil. The dam at Lake Manitou, the station's water supply, was torn out and rebuilt. Sheet steel piling was driven along the toe of the dam to a depth of 18 feet to prevent seepage, and the floor, wing walls, and apron were reconstructed of reinforced concrete. A six-room residence and garage, both of brick, were constructed. A new bridge was built across the creek that traverses the station grounds.

UPPER MISSISSIPPI WILDLIFE AND FISH REFUGE

Up to this year the principal activities within the Upper Mississippi Wild Life and Fish Refuge have been the salvage of stranded fish in overflow areas. However, the virtual completion of the 9-foot channel has nullified this activity, as is shown by the fact that only 1,864,820 fish were rescued in comparison with the annual turnover of 40 or 50 million fish in previous years.

A new phase of activity has, therefore, been undertaken by the construction of an extensive series of propagating ponds, many entirely artificial while others are seminatural. Several of these have been in use for the past few seasons and have yielded excellent results. During the year additional pond acreage was under development at Genoa, Wis., and Guttenberg, Iowa. The former, which produced approximately two million bass fingerlings, now constitutes an extensive fish-cultural unit, while the latter, when completed, will be one of the largest hatchery developments in the country. A number of years will be required for full realization of this program, but the projects are being placed in productive operation as fast as individual ponds can be completed. The La Crosse (Wis.) Station, headquarters for these activities, has hatched and distributed 1,082,600 trout for direct planting in suitable waters and for transfer to Forest Service rearing ponds and cooperative nurseries maintained by sportsmen's clubs.

The Homer (Minn.) substation was largely engaged in the overhauling and repairing of equipment, boats, trucks, etc., utilized in that territory. The personnel also constructed seines, dip nets, egg cases, boats, outlet kettle forms, and other apparatus for use at the various hatcheries.

Fish rescued and restored to original waters, fiscal year 1939

Species	*Number*
Black bass	9, 700
Crappie	121, 300
Sunfish	210, 400
Catfish	1, 379, 000
Yellow perch	93, 600
Pike pickerel	2, 620
Buffalofish	31, 700
White bass	7, 500
Miscellaneous	9, 000
Total	1, 864, 820

NOTE.—The station at Guttenberg, Iowa, handled 1,352,020 of the above-enumerated fish and the station at Marquette, Iowa, handled 512,800.

AQUARIUM

The Bureau of Fisheries' aquarium, which is located in the basement under the main lobby in the Department of Commerce Building, has constantly increased in popularity among all classes of visitors. The fact that it is open to the public on Saturday afternoons and Sundays until 4 p. m. has enabled many who would not otherwise find it possible to view the displays during the weekends.

The number of specimens and species on display has varied somewhat during the year, but, as a general rule, approximately 1,500 individual specimens, representing about 50 varieties, are shown in the 47 tanks and 3 floor pools.

A consignment of spoonbill catfish (*Polyodon spathula*) collected from the Ohio River was received. However, the shipment arrived during the rainy season and the fish were unable to endure the chlorine in the water. Small activated carbon filters have been installed for the purpose of removing as much of the chlorine as possible in order to maintain the species that are susceptible to this chemical.

Further experiments were made with potassium permanganate in the treatment of fish affected by external parasites, expecially with regard to the application of such remedial measures to specimens held in outdoor pools.

The seasonal miniature hatchery, which is a special attraction to biology classes, was on display for the purpose of illustrating the methods utilized to incubate non-buoyant and semi-buoyant eggs.

In addition to holding fish in the reserve tanks for distribution to applicants in this locality, the aquarium was used in preparing and forwarding shipments of live fish and eggs to Puerto Rico and Colombia.

DISTRIBUTION OPERATIONS

As the majority of distribution-car trips are made from stations in the Mississippi River territory, this service was partly decentralized during the year by the assignment of an Assistant Superintendent of Distribution to the La Crosse (Wis.) station. This procedure will expedite distribution, inasmuch as it is often necessary to move fish in that area without delay. This condition was brought about by the fact that the ponds constructed in the Mississippi River refuge have been very productive, and proper holding facilities for large numbers of fish are not available.

The same number of fish can be carried by truck as by distribution car, to destinations within a radius of approximately 300 miles, at about one-fourth the cost. For this reason the Bureau is purchasing additional automotive equipment, as funds permit, and car No. 7, the oldest distribution car in Bureau service, was decommissioned and recommended for condemnation.

Many types of aerating equipment are in use at present by various Government and private agencies engaged in the distribution of fish by truck. The purpose of this equipment is the maintenance of the oxygen content and temperature of the water in the truck tanks at a level best suited to the fish during transportation. The Bureau's distribution trucks have been equipped with several different types of aerating apparatus in an effort to determine, from experience in actual use, which is best suited to this service. Upon conclusion of these trials the type of apparatus which has rendered the most satisfactory service will be adopted as standard.

Truck deliveries during the year aggregated 333,950 miles, exclusive of the distance traveled by National Park, National Forest, and State conservation department trucks engaged in the distribution of fish produced at Federal hatcheries. Neither does the above figure include travel by individuals and sportsmen's organizations who called at the hatcheries to receive their allotments of fish. The distribution cars engaged in the delivery of fish to applicants, and transfers of fish between hatcheries, made 77 trips during the year and carried an average of 260 pails per trip. The cars traveled 52,899 paid miles and 11,789 free miles. Detached messengers traveled 45,152 paid miles and 1,639 free miles in delivering fish to applicants. The Bureau was again favored with free transportation and reduced rates by a number of the railroads.

Summary, by States, of the distribution of fish, fiscal year 1939

State and species	Number
Alabama:	
Black bass, largemouth	871, 280
Black bass, smallmouth	27, 600
Catfish	20
Crappie	150
Rainbow trout	20, 100
Rock bass	1, 770
Sunfish	1, 836, 320
Arizona: Black bass, largemouth	40, 000
Arkansas:	
Black bass, largemouth	138, 075
Black bass, smallmouth	110, 000
Crappie	6, 125
Rainbow trout	1, 100
Rock bass	8, 000
Sunfish	55, 250
Warmouth bass	1, 500
California: Chinook salmon	18, 088, 500
Colorado:	
Black bass, largemouth	29, 900
Blackspotted trout	1, 094, 780
Brook trout	2, 053, 995
Catfish	4, 600
Crappie	3, 000
Lake trout	21, 700
Loch Leven trout	102, 800
Rainbow trout	1, 151, 850
Rock bass	615
Sunfish	16, 300
Connecticut:	
Black bass, smallmouth	398, 000
Brook trout	19, 500
Rainbow trout	3, 250
Florida:	
Black bass, largemouth	547, 195
Catfish	300
Sunfish	19, 960
Georgia:	
Black bass, largemouth	337, 185
Black bass, smallmouth	3, 640
Brook trout	185, 260
Catfish	8, 950
Crappie	1, 010
Kentucky bass	7, 250
Rainbow trout	84, 945
Sunfish	519, 530
Idaho:	
Blackspotted trout	669, 050
Brook trout	167, 045
Landlocked sockeye salmon	318, 200
Rainbow trout	1, 698, 410
Sockeye salmon	159, 870
Steelhead trout	17, 360
Illinois:	
Black bass, largemouth	18, 840
Black bass, smallmouth	52, 000
Brook trout	5, 500
Catfish	7, 350
Crappie	2, 910
Pike perch	1, 500, 000
Sunfish	29, 505
Indiana:	
Black bass, largemouth	1, 133, 850
Black bass, smallmouth	38, 070
Brook trout	105, 200
Catfish	4, 340
Crappie	6, 750
Loch Leven trout	163, 840
Rainbow trout	99, 415
Rock bass	34, 725
Sunfish	657, 400
Yellow perch	2, 590
Iowa:	
Black bass, largemouth	53, 905
Black bass, smallmouth	3, 600
Buffalofish	800
Catfish	220, 385
Crappie	26, 630
Loch Leven trout	10, 100
Rainbow trout	23, 675
Iowa—Continued.	
Rock bass	9, 220
Sunfish	184, 840
Kansas:	
Black bass, largemouth	8, 560
Crappie	850
Rainbow trout	5, 000
Sunfish	14, 700
Kentucky:	
Black bass, largemouth	63, 330
Black bass, smallmouth	305, 140
Crappie	300
Rock bass	12, 100
Sunfish	8, 445
Louisiana:	
Black bass, largemouth	273, 840
Sunfish	415, 850
Warmouth bass	33, 615
Maine:	
Black bass, smallmouth	84, 000
Brook trout	558, 585
Flounder	603, 000, 000
Lake trout	67, 800
Lobster	2, 900, 450
Rainbow trout	4, 800
Maryland:	
Black bass, largemouth	43, 750
Black bass, smallmouth	800
Brook trout	100
Catfish	150
Loch Leven trout	2, 995
Rainbow trout	81, 560
Sunfish	20, 965
Yellow perch	6, 701, 850
Massachusetts:	
Black bass, smallmouth	147, 000
Brook trout	336, 090
Cod	132, 605, 190
Flounder	277, 133, 170
Haddock	5, 768, 340
Lobster	1, 148, 500
Mackerel	11, 060, 000
Pollock	50, 762, 700
Rainbow trout	20, 720
Michigan:	
Black bass, largemouth	271, 670
Black bass, smallmouth	9, 675
Brook trout	827, 720
Lake trout	692, 250
Loch Leven trout	1, 200
Rainbow trout	115, 770
Sunfish	120, 350
Whitefish	900, 000
Minnesota:	
Black bass, largemouth	525, 735
Black bass, smallmouth	4, 520
Brook trout	372, 400
Crappie	11, 575
Lake herring	3, 000, 000
Lake trout	185, 500
Loch Leven trout	96, 400
Pike perch	13, 640, 000
Rainbow trout	94, 900
Sunfish	24, 050
Mississippi:	
Black bass, largemouth	968, 000
Sunfish	860, 925
Missouri:	
Black bass, largemouth	771, 940
Black bass, smallmouth	200, 000
Catfish	10. 450
Crappie	47, 100
Rainbow trout	50, 000
Rock bass	7, 500
Sunfish	153, 240
Montana:	
Black bass, largemouth	7, 670
Blackspotted trout	3, 171, 655
Brook trout	248, 010
Catfish	43, 715

Summary, by States, of the distribution of fish, fiscal year 1939—Continued

State and species	Number
Montana—Continued.	
Crappie	28,500
Golden trout	71,040
Grayling	445,280
Loch Leven trout	268,400
Rainbow trout	1,142,170
Sunfish	46,960
Nebraska:	
Black bass, largemouth	10,600
Brook trout	146,150
Catfish	11,300
Crappie	25,775
Grayling	2,770
Rainbow trout	398,200
Rock bass	4,500
Sunfish	6,000
Nevada:	
Black bass, largemouth	86,000
Brook trout	52,000
Rainbow trout	79,480
New Hampshire:	
Black bass, smallmouth	147,000
Brook trout	470,870
Catfish	200
Lake trout	3,500
Loch Leven trout	2,500
Rainbow trout	3,340
New Jersey:	
Black bass, largemouth	10,280
Brook trout	10,000
Catfish	100
Flounder	11,774,000
Rainbow trout	27,400
Sunfish	13,850
New Mexico:	
Black bass, largemouth	883,010
Black bass, smallmouth	12,000
Blackspotted trout	93,000
Brook trout	37,900
Catfish	17,420
Crappie	33,630
Rainbow trout	480,000
Sunfish	568,800
New York:	
Black bass, largemouth	10,500
Black bass, smallmouth	243,685
Brook trout	735,125
Flounder	172,578,000
Lake trout	756,970
Loch Leven trout	118,915
Rainbow trout	127,000
Whitefish	20,000
North Carolina:	
Black bass, largemouth	713,060
Brook trout	223,325
Crappie	37,670
Loch Leven trout	40,145
Rainbow trout	317,175
Rock bass	500
Shad	6,615,000
Striped bass	1,797,950
Sunfish	251,890
Warmouth bass	16,000
White perch	4,300,000
Yellow perch	998,140
North Dakota:	
Black bass, largemouth	51,300
Brook trout	750
Catfish	2,750
Crappie	23,820
Sunfish	20,520
Ohio:	
Black bass, largemouth	135,740
Brook trout	5,200
Catfish	9,200
Crappie	2,025
Loch Leven trout	35,000
Pike perch	314,500,000
Rainbow trout	38,850
Rock bass	20,950
Sunfish	88,100
Oklahoma:	
Black bass, largemouth	199,340
Crappie	25,930
Rainbow trout	4,540
Sunfish	567,950
Oregon:	
Brook trout	508,145
Chinook salmon	1,946,280
Rainbow trout	215,000
Steelhead trout	63,000
Pennsylvania:	
Black bass, largemouth	50,415
Brook trout	194,940
Catfish	7,750
Loch Leven trout	135,665
Rainbow trout	240,815
Sunfish	84,950
Rhode Island:	
Black bass, smallmouth	4,000
Brook trout	750
Flounder	121,455,000
South Carolina:	
Black bass, largemouth	459,935
Black bass, smallmouth	50
Brook trout	135,405
Catfish	500
Crappie	20,975
Loch Leven trout	2,000
Rainbow trout	144,125
Shad	1,534,000
Sunfish	822,975
Warmouth bass	32,800
Yellow perch	1,800
South Dakota:	
Black bass, largemouth	25,610
Blackspotted trout	22,000
Brook trout	102,185
Catfish	43,750
Crappie	8,500
Loch Leven trout	52,500
Rainbow trout	600,655
Sunfish	24,000
Tennessee:	
Black bass, largemouth	837,750
Black bass, smallmouth	28,750
Brook trout	190,630
Crappie	550
Kentucky bass	3,100
Loch Leven trout	2,350
Pike perch	450,000
Rainbow trout	536,380
Rock bass	8,975
Sunfish	101,290
Texas:	
Black bass, largemouth	1,441,270
Catfish	8,600
Crappie	30,790
Rainbow trout	7,500
Rio Grande perch	175,760
Rock bass	5,100
Sunfish	897,515
Warmouth bass	8,100
Utah:	
Black bass, largemouth	4,295
Blackspotted trout	657,160
Brook trout	565,410
Chum salmon	94,080
Landlocked sockeye salmon	47,000
Rainbow trout	573,665
Silver salmon	78,955
Sockeye salmon	188,080
Sunfish	800
Vermont:	
Black bass, largemouth	1,275
Brook trout	1,330,365
Lake trout	12,000
Landlocked salmon	5,990
Rainbow trout	2,500
Virginia:	
Black bass, largemouth	91,380
Black bass, smallmouth	6,485

Summary, by States, of the distribution of fish, fiscal year 1939—Continued

State and species	Number
Virginia—Continued.	
Brook trout	134, 395
Catfish	275
Crappie	7, 285
Pike Perch	400, 000
Rainbow trout	475, 915
Rock bass	12, 500
Shad	31, 174, 225
Sunfish	112, 640
Yellow perch	292, 968, 000
Washington:	
Black bass, largemouth	3, 125
Blackspotted trout	664, 765
Brook trout	661, 250
Chinook salmon	28, 247, 230
Chum salmon	7, 876, 275
Crappie	6, 000
Rainbow trout	539, 210
Silver salmon	716, 675
Sockeye salmon	1, 557, 555
Steelhead trout	864, 900
Sunfish	13, 000
West Virginia:	
Black bass, largemouth	39, 105
Black bass, smallmouth	10, 380
Brook trout	28, 480
West Virginia—Continued.	
Crappie	17, 600
Lock Leven trout	23, 760
Rainbow trout	109, 825
Sunfish	151, 860
Wisconsin:	
Black bass, largemouth	1, 395, 545
Black bass, smallmouth	16, 000
Brook trout	460, 100
Catfish	3, 700
Crappie	47, 250
Lock Leven trout	257, 420
Rainbow trout	280, 800
Sunfish	38, 350
Yellow perch	600
Wyoming:	
Black bass, largemouth	10, 050
Blackspotted trout	7, 151, 600
Brook trout	742, 745
Catfish	16, 325
Grayling	4, 306, 755
Lake trout	7, 500
Rainbow trout	577, 050
Sunfish	4, 150
Yellow perch	10, 000